

TRANSECT SITES
FOR OIL SPILL STUDY

Dr. G. Chan

Transect Number		Computer File No.	m ² samples	Main species
<u>DUXBURY REEF</u>				
ocean ↑ beach ↓	AT - 1	1 - 1	_____ [2] [1]	TEG, dm ² sampling of LIT, BAL
	AT - 2	1 - 2	_____ [2] [1]	TEG, ACM, LIT, BAL, MOP, AEL, PAC, CPP
	AT - 3	1 - 3	_____ [2] [1]	TEG, MOP, PAC, CPP, * for PLA
	AT - 4	1 - 4	_____ [2] [1]	TEG, ACM, LIT, POL, MOP, CPP
	AT - 5	1 - 5	_____ [2] [1]	TEG, ACM, MYT, POL, MOP, * for BAL
	AT - 6	1 - 6	_____ [2] [1]	ACM, LIT, MYT, POL, MOP, * for BAL
	AT - 7	1 - 7	facing cliff [1] [8] [7] [2] [9] [6] [3] [4] [5]	TEG, ACM, MOP, AEL, CPP
	AB-8,9,10	1-8,9,10	see berm worksheets	ACM, LIT, POL, AEL, dm ² for BAL
	BT - 1	2 - 1	_____ [2] [1]	TEG, BAL, AEL
	BT - 2	2 - 2	_____ [2] [1]	TEG, ACM, LIT, ACA, AEL
	BT - 3	2 - 3	_____ [2] [1]	TEG, ACA, MOP, CPP, * for PLA
	BT - 4	2 - 4	_____ [2] [1]	TEG, ACM, ACA, MOP, AEL
	BT - 5	2 - 5	_____ [2] [1]	ACM, LIT, MYT, POL, STR, dm ² for BAL
	BR - 9	2 - 6	2 tidepools	<u>Hermaeina smithii</u> , * others
	BR -10	2 - 7	500 meter ridge	<u>Lottia gigantea</u> , * others
	CT - 1	3 - 1	_____ [2] [1]	TEG, ACM, ACA, MOP, AEL, CPP
	CT - 2	3 - 2	_____ [2] [1]	TEG, ACM, LIT, ACA, MYT, POL, Dm ² for MYT in AXA, dm ² for BAL
	CT - 4	3 - 3	Mussel Bed	set m, POL.
	CT - 5	3 - 4	Seastar corner	AST
	CT - 6	3 - 5	Scrapped m ²	TEG, ACM, MOP, CPP
	CT - 7	3 - 6	Mushroom rock	TEG, ACM, LIT, ACA, BAL, AEL, CPP
	CT -10	3 - 7	see transect notes	<u>Lottia gigantea</u> only, * others
	CT -11	3 - 8	see transect notes	AXA total count only
	CT -12	3 - 9	sieve	<u>Saccoglossus</u> sp.
	CT-13,14,15	3 -12	Island, Shark rock, Bolinas Pt.	tagged HAL
	SA - 1	4 - 1	Sausalito Seal Statue	Dm ² of BAL, PAC, others try to duplicate dm ² plots
	FB - 1	5 - 1	Ft. Baker	Dm ² of BAL, others
	SB - 1	6 - 1	Stinson Beach	EME, NEP, ORC, others
	DB - 1	7 - 1	Drakes Beach	EME, NEP, ORC, others (check ORC in Zone 1)
	CR-5,6,7	8 - 1	Chimney Rock subtidal	HAL, STR
	BR-1,2,3	9-1,2,3	Bird Rock transects	many
	BR - 4	9 - 4	Bird Rock subtidal	HAL, STR

Liters to gallons conversion table

Liters	Gallons	Liters	Gallons	Liters	Gallons
1	.3	34	9.0	68	18.0
2	.5	35	9.2	69	18.2
3	.8	36	9.5	70	18.5
4	1.1	37	9.8	71	18.8
5	1.3	38	10.0	72	19.0
6	1.6	39	10.3	73	19.3
7	1.8	40	10.6	74	19.6
8	2.1	41	10.8	75	19.8
9	2.4	42	11.1	76	20.1
10	2.6	43	11.4	77	20.3
11	2.9	44	11.6	78	20.6
12	3.2	45	11.9	79	20.9
13	3.4	46	12.2	80	21.1
14	3.7	47	12.4	81	21.4
15	4.0	48	12.7	82	21.7
16	4.2	49	12.9	83	21.9
17	4.5	50	13.2	84	22.2
18	4.8	51	13.5	85	22.5
19	5.0	52	13.7	86	22.7
20	5.3	53	14.0	87	23.0
21	5.5	54	14.3	88	23.2
22	5.8	55	14.5	89	23.5
23	6.1	56	14.8	90	23.8
24	6.3	57	15.0	91	24.0
25	6.6	58	15.3	92	24.3
26	6.9	59	15.6	93	24.6
27	7.1	60	15.9	94	24.8
28	7.4	61	16.1	95	25.1
29	7.7	62	16.4	96	25.4
30	7.9	63	16.6	97	25.6
31	8.2	64	16.9	98	25.9
32	8.5	65	17.2	99	26.1
33	8.7	66	17.4	100	26.4
		67	17.7		

For more precise conversion
1 liter = .2642 gallons
1 gallon = 3.785 liters

The numbers and kinds of resident plants and animals are of value in determining the basic nature of an environment. If there are many individuals of a few species, conditions are indicated that will favor the presence of organisms having a wide range of tolerance. Under such conditions, the environment is probably eutrophic. A few organisms that include many species indicate an oligotrophic environment. Organisms in oligotrophic environments have narrow ranges of tolerance for many factors.

Oligotrophic environment: These very clear waters are characterized by high stability (that is, narrow ranges of most conditions). They are nutrient poor (low concentrations of nutrient salts) with small but diverse populations of plants and animals.

Mesotrophic environment: These waters are characterized by intermediate values of most factors. Ranges of extremes of these factors fall between the ranges found in oligotrophic and eutrophic classifications. Mesotrophic environments may have characteristics approaching oligotrophic conditions early in the growing season. They may approximate eutrophic conditions late in the growing season in temperate climates.

Eutrophic environment: These usually turbid, nutrient-rich waters are characterized by a general lack of stability (wide ranges of extremes of most factors). Variations exist from one sampling site to another, from one time of day to another, and especially between surface and bottom regions. Plants and animal populations are abundant and composed of a few species of a tolerant nature.

Diversity Index: Generally, in ecological systems, a complex biological community connotes a stable environmental situation. Evaluation of an ecosystem can often be accomplished by measuring the number of species in the biological community. One way of expressing this relationship is Simpson's (1949) Diversity Index.

$$\bar{d} = \frac{(\text{total \#s of organisms})^2}{(\text{total \#, species a})^2 + (\text{\# of b})^2 + (\text{\# of c})^2 + \text{etc.}}$$

OR

$$\bar{d} = \frac{N^2}{\sum (n)^2}$$

This index increases as the numbers of species increase in a population of a given size. A sample of 30 individuals, all the same species, has an index of 1. A sample of 30 that has 3 species (10 individuals each) has an index of 3.0. The diversity index is a biological indication of stability of an environment. A high index (many different species with few numbers) implies a stable, oligotrophic or mesotrophic environment. A low index (few species among many organisms) implies a eutrophic or otherwise unstable environment.

1/18/71
ALL SITES

TIME LOG FOR ALL STUDY SITES for Investigator J. Chan

Year	Date	Location			General Observations
		Tide, Time	Area, Sect.	Trans-sect	
1971	1/18	1:42 AM collision	SF Bay		OK SPILL
	1/19	1:42 AM	SA	100 m	Out of 100 oil covered crabs, 20 were alive
	1/23	-0.8 C 3:18 PM	DX		Survey of reefs R.D. Chronicle & science reporter, David Berkman
	2/9	-0.5 C 5:30 AM	Bolinas		
	2/12	2.1 E 6:24 AM	DX		
	2/23	-1.1 E 4:18 PM	DX	C	
	3/5	-0.2 E 1:30 PM	DX	C	
	3/6	-0.3 E 2:24 PM	DX	C	NSF Institute
	3/20	-0.1 E 12:24 PM	Bolinas		NSF Institute
	3/23	-0.6 E 2:54 PM	DX	C	
	3/25	-0.1 E 4:18 PM	BMS		
	3/30	-0.8 E 8:24 AM	BMS		
	4/1	-0.4 E 10:30 AM	DX	C	
	4/2	-0.2 E 11:42 AM	DX	A, B	
	4/7	0.7 E 3:36 PM	DX	A, B, C	as Dale Stranghan
	4/15	-0.3 E 8:36 AM		B	
	4/16	-0.3 E 9:36 AM	ST		
	4/20	-0.1 E 1:30 PM	DB		
	4/27	-1.5 E 8:06 AM	DX	Buquin	
	4/29	-0.9 E 9:54 AM	DX	C	few bright green lobes 20 <i>Potilloides eintopis</i> and 12 <i>Cancer restornerius</i>
	4/30	-0.5 E 10:54 AM	DX	outside	

TIME LOG FOR ALL STUDY SITES

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Year	Date	Tide, Time	Location Area, Sect.	Transect	General Observations
1971	5/13	-0.9 @ 8:30 AM	SA		
	5/14	-0.9 @ 9:18 AM	BR	subtidal	
	6/10	-1.3 @ 7:30 AM	DX	C	dense catenomorpha on mussels
	6/11	-1.3 @ 8:12 AM	BR	subtidal	
	7/8	—	DX	subtidal CT14	w Cadant stand
	7/9		DX		heavy catenomorpha growth along w catenomorpha
	7/10	-1.2 @	DX	CT-12	ulva in all three areas, over rocks ^{many} rocks
	7/20	-1.2 @ 5:12 AM	DX		
	7/21	-1.0 @ 6:36 AM	DX		
	7/23	-0.8 @ 7:12 AM	DX		
	7/19-7/28	week	DX A, B		Oil still seeping into tidepools from the upper beach sands

1/18/71
ALL SITES

TIME LOG FOR ALL STUDY SITES

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Year	Date	Tide, Time	Area, Sect.	Tran- sect	General Observations

○ = oil

Sept, 1971

PROPOSED POST-OIL SPILL STUDY SITES, 1971-72

CODE

SA

SAUSALITO

4-1

number of
transects

1

FB

FORT BAKER
SOUTH MUIR BEACH

5-1

1

SB

STINSON BEACH

6-1

1

oil graded off

~~BL~~

~~BOLINAS LAGOON~~

~~3~~

DX

DUXBURY REEF

A = 1-1 through 1-10
B = 2-1 through 2-8
C = 3-1 through 3-11

10

8

11

~~BP~~

~~BOLINAS POINT
RCA REEF~~

~~5~~

DP

DOUBLE POINT

10-1, 10-2

2

~~BEAR VALLEY~~

DB

DRAKES BEACH

7-1

1

CR

CHIMNEY ROCK

8-1

1

BR

BIRDS ROCK

9-1 through 9-4

4

Σ 46

All sites have pre-oil spill data

COMPARATIVE

PROPOSED POST-OIL SPILL STUDY SITES, 1971-72

TREATMENT & CONTROL

SAUSALITO (OIL)

Red Rock

find Bay site with no oil

~~NORTH MILP BEACH~~

STINSON BEACH (OIL) and DRAKES BEACH (NO OIL)
Boyle's sand fence

BOLINAS LAGOON (OIL)

Clam Beds

DUXBURY REEF ^{residual} (OIL) and (NO OIL) Subtidal also

A

B

C

mid to
high tide

low
tide areas

~~BCA REEF~~

BOLINAS POINT (NO?) Subtidal only

DOUBLE POINT (OIL) Subtidal only

~~BEAR VALLEY~~

DRAKES BEACH (NO OIL) and STINSON BEACH (OIL)
Ranger Station

CHIMNEY ROCK (NO OIL) Subtidal only
abalones, snappers

BIRD ROCK (NO OIL) Subtidal also

POST-OIL SPILL STUDY SITES, 1971-72

Location	Area	Type of Transect	Oil?	Pre-Data	Ran-dom?	Organisms
DUXBURY REEF areas A, B, & C	AT-1	barren area	✓	1969	10m ²	alg
	AT-2	Δ 30m from channel	✓	1969	10m ²	alg, trop
	AT-3	flood channel	no	1969	10m ²	alg, trop, Acorn, A. fan
	AT-4	lagoon channel	✓	1969	10m ²	alg, Acorn, Lotti, Litt, Platyodon
	AT-5	lagoon channel	✓	1969	10m ²	alg, Lotti, Acorn, trop, Litt
	AT-6	9m x 4m	✓	1969	4m ²	alg, trop
	AT-7	cliff line	✓	1969	9m ²	alg, A. fan, Acorn, scabra
	AB-8	Burn 1	✓	1964	10m ²	Litt, Acorn, Bal
	AB-9	Burn 2	✓	1964	10m ²	Litt, Acorn, Bal
	AB-10	Burn 3-10	✓	no	10m ²	Litt, Acorn, Bal
	AS-11	stake #1	✓	1962	5m ²	alg, Lotti, trop, A. de. from app.
	AS-12	stake #2	✓	1962	2m ²	Acorn, trop
	AS-13	stake #3	✓	1962	2m ²	alg, Acorn
	AT-14	10m x 10m	✓	1969	10m ²	Strongylocentrotus pur, Platyodon
	AT-15	10m x 10m	✓	1969	10m ²	alg, Bal, A. de
(1-)	BT-1	25m offshore	✓	1969	10m ²	alg, Bal, A. de
	BT-2	Δ	✓	1969	10m ²	alg, Acorn, Litt, Acorn, scabra
	BT-3	channel	no	1969	10m ²	alg, Acorn, Platy
	BT-4	mesotax	no	1969	10m ²	alg, Acorn, trop, A. de
	BT-5	meso	no	1969	10m ²	Acorn, trop, alg, Lotti, trop, Strongylo
	BT-6	extreme	✓	1969	9m ²	alg, Acorn, Bal, A. de
	BT-7	9 transects but BT-5 & BT-6	✓	1970	9m ²	alg, trop
	BB-8	Burn	✓	no	no	Litt, Acorn, Bal
	BR-9	ridge tidgods	✓	1959	2m ²	Nerminia orithia
	BR-10	ridge	✓	1959	500m	Lottia gigantea
	BT-11	10m x 10m	no	1962	no	Cryptochiton stelleri
	BT-12	every 50m	no	no	no	Strongylocentrotus, Platyodon
(2-)	CT-1	island	✓	1969	10m ²	alg, Acorn, Acorn, scabra, trop
	CT-2	anemone crevice	no	1969	10m ²	alg, alg, A. fan, Bal, Litt
	CT-3	Bed I	✓	1968	10m ²	alg
	CT-4	Bed IV	✓	1965	10m ²	alg, Lotti
	CT-4a	15' x 1' string	✓	1957	3	alg
	CT-5	limestone corner	✓	1969	10m ²	alg, Pinnaster, A. fan
	CT-6	scraped patch	✓	1968	1m ²	Acorn, scabra
	CT-7	mushroom rock	✓	1969	1m ²	alg, Acorn, Bal, Litt, Acorn, scabra
	CT-8	Lotti's pool	✓	1970	10m ²	alg, Lotti
	CT-9	near rocks	no	1968	5m ²	Strongylocentrotus
	CT-10	10m x 20m	✓	1968	no	Lottia gigantea
	CT-11	10m crevice	✓	1968	no	A. fanthogramma
	CT-12	flood channel	no	1959	siwe	Puccoglossus sp.
	CT-13	island	no	1967	sub-tidal	Halictes rufescens
(3-)	CT-14	shark's tooth rock	no	1967	sub-tidal	Halictes rufescens
	Bolinas Pt.	sub-tidal	AT-15	no	no	Strongylo, Platyodon
		CT-15	no	no	no	Strongylo, Platyodon

POST-OIL SPILL STUDY SITES, 1971-72

Location	Area	Type of Transect	Oil?	Pre-Data	Ran-dom?	Organisms
DUXBURY REEF	AT-1	barren area	✓	1969	10m ²	leg
areas A, B, & C	AT-2	Δ 30m from channel	✓	1969	10m ²	leg, trop
Vetromile, Anderson	AT-3	flood channel	no	1969	10m ²	leg, trop, decan, A. fan
	AT-4	vegetated channel		1969	10m ²	leg, decan, Lolli, Litt, Platyodon
	AT-5	agate island	✓	1969	10m ²	myt, Lolli, decan, trop, Litt
Dager, Kuchessa	AT-6	9m x 4m		1969	4m ²	myt, leg
Vetromile, Anderson	AT-7	cliff line	✓	1969	9m ²	leg, A. fan, decan, scabra
Biere, Smith	AB-8	Berm 1	✓	1964	10m ²	Litt, decan, Bal
	AB-9	Berm 2	✓	1964	10m ²	Litt, decan, Bal
Melton, Mykhetich	AB-10	Berm 3-10	✓	no	10m ²	Litt, decan, Bal
Peck	AS-11	stake #1	✓	1962	5m ²	myt, Lolli, leg, A. de, fcm off.
	AS-12	stake #2	✓	1962	2m ²	decan off, trop
	AS-13	stake #3	✓		2m ²	myt, decan off
Ziegler	AT-14	every 50m		1969	m ²	Strongylocentrotus pur, Platyodon
Trombridge Freis	BT-1	25m offshore	✓	1969	10m ²	leg, Bal, Anole
	BT-2	Δ	✓	1969	10m ²	leg, decan, Litt, decan, scabra
	BT-3	channel	no	1969	10m ²	leg, decan, Platy
	BT-4	mesatop	no	1969	10m ²	leg, decan off, trop, A. de
	BT-5	area	no	1969	10m ²	decan off, myt, Lolli, trop, Strongylo
	BT-6	entrance		1969	9m ²	leg, decan, Bal, A. de
	BT-7	9 transects bet BT-3 & BT-4		1970	90m ²	leg, trop
	BB-8	Berm	✓	no		Litt, decan, Bal
	BR-9	ridge tidgates	✓	1959	2m ²	Nermines, onitii
	BR-10	ridge	✓	1959	500m	Lottia gigantea
	BT-11	10m x 10m	no	1962		Cryptochiton, Stelleri
	BT-12	every 50m		no	m ²	Strongylocentrotus, Platyodon
Gelbaum	CT-1	island	✓	1969	10m ²	leg, decan, decan, scabra, trop
Ball	CT-2	anemone crinoid	no	1969	10m ²	leg, myt, A. fan, Bal, Litt
	CT-3	Bed I	✓	1968	10m ²	myt
Measles Wright	CT-4	Bed IV	✓	1965	10m ²	myt, Lolli
	CT-4a	15' x 1' string	✓	1957	3	myt
Ignacio, Stenzel	CT-5	limestone corner	✓	1969	10m ²	myt, Pissaster, A. fan
Gelbaum	CT-6	scraped patch	✓	1968	1m ²	decan, scabra
	CT-7	mushroom rock	✓	1969	1m ²	leg, decan, Bal, Litt, decan, se
	CT-8	10m x 2m pool	✓	1970	10m ²	myt, Lolli
	CT-9	sea urchins	no	1968	5m ²	Strongylocentrotus
	CT-10	10m x 20m	✓	1968		Lottia gigantea
Ball	CT-11	10m crinoid	✓	1968		A. fenthogrammisa
Chan	CT-12	flood channel	no	1959	siwe	Paeoglossus sp.
	CT-13	island	no	1967	sub- tidal	Halictes rufescens
Chan	CT-14	shark's tooth rock	no	1967	sub- tidal	Halictes rufescens

POST-OIL SPILL STUDY SITES, 1971-72

4-1 and 5-1

Location	Area	Type of Transect	Oil?	Pre-Data	Ran-dom?	Organisms
SAUSALITO rocky intertidal	Seal Rock 4-1	SA-1 10 m ² transect ≥ 6 dm ² samples in each m ² Total of 63 dm ² samples	✓	no	no	<i>Balanus glandula</i> <i>Polydora</i> few <i>Littorina</i> and <i>Alpheia</i>
		dd transect described by grading, etc.		✓		
	Seal Rock Block 5-1	FB-1 SA-2 10 m ² transect 5 dm ² samples in each control transect to compare w SA-1	no	no	no	<i>Balanus</i> C

STB
6-1

top oil-covered
6" sand gradaf
off

POST-OIL SPILL STUDY SITES, 1971-72

Location	Area	Type of Transect	Oil?	Pre- Data	Ran- dom?	Organisms
STINSON BEACH * oil covered, top 6" sand was graded off before first post-oil spill count.	Boyle's sand fence	SB-1 Total of 10 m ² samples, one m ² sample every tenth meter mea- surement (90 m transect)	✓ on 1/12/71 *	1965	no	<i>Emerita analoga</i> <i>Orchestoidea californica</i> <i>Depthyos californica</i> pinn: <i>Crago nigronaculata</i>

1/18/71

INDIVIDUAL SITE

DB

TIME LOG FOR STUDY SITE DRAKES BEACH
location

Year	Date	Tide, Time	Area, Sect.	Tran- sect	General Observations
1970					stretch of 30 x 10 yds = <i>Eugonius mucronata</i> 1500 count of 1500 in one dm ³ sample
1971	1/18				OIL SPILL
1971	4/20	-0.3e 1:30 PM	Ranger station 140°SE	DB-1 DB-2	No sign of <i>Eugonius mucronata</i> 121 <i>Emerita analoga</i> ♂ and ♀

POST-OIL SPILL STUDY SITES, 1971-72

Location	Area	Type of Transect	Oil?	Pre-Data	Random?	Organisms
DRAKES BEACH	DB-1	Total 910 m ² taken at diff intervals along 30 m	no	1970	no	<i>Emerita analoga</i> <i>Dephtys carolinensis</i> <i>Leukinereis gozata</i> <i>Archaeomys maculata</i>
	DB-2	range of count linear and square inch + average	no	no	yes	<i>Balanus crenatus</i>

1/18/71
INDIVIDUAL SITE
CR

Year	Date	Tide, Time	Area, Sect.	Tran- sect	General Observations

POST-OIL SPILL STUDY SITES, 1971-72

Location	Area	Type of Transect	Oil?	Pre-Data	Random?	Organisms
CHIMNEY ROCK	CR-1	subtidal				
	CR-2					

BR

TIME LOG FOR STUDY SITE

BEAR VALLEY

location

Year	Date	Tide, Time	Area, Sect.	Tran- sect	General Observations

POST-OIL SPILL STUDY SITES, 1971-72

Location	Area	Type of Transect	Oil?	Pre- Data	Ran- dom?	Organisms
BEAR VALLEY						
BIRD ROCK	BR-1	published	no			
	BR-2					

10-1
10-2

POST-OIL SPILL STUDY SITES, 1971-72

Location	Area	Type of Transect	Oil?	Pre- Data	Ran- dom?	Organisms
DOUBLE POINT	DP-1	subtidal				

D
X

Area
A

AT-1
pk

fucus peltatus

barren ridges

2m

mossy green

(Raflesia pinnata anchored on rock)

Year Date Tide/Time Water temp. Other

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

AT-2

A hand-drawn map of a coastal area. At the top, a horizontal line is labeled "ocean". Below this line, a "flood channel" is depicted. To the right of the channel, a sloped area is labeled "1 foot deep" and "crevice". On the left side, a vertical dashed line is labeled "4 1/2 meters". In the center, there is a "large pool". At the bottom, a horizontal line is labeled "water". To the right of the water line, there is a small rectangular area labeled "edge of pool".

Investigator _____

Year 1971 Date 4/2 Tide/Time 11:42 AM Water temp. 10.2 C Other

Year 1966 Date 7/2 Tide/Time _____ Water temp. _____ Other _____

[illegible]

1-3
AT-3
~~P3~~
p7

ocean

211

of road channel ¹/₃₅ miles

A hand-drawn map of the beach area. At the top, a horizontal line represents the road. Below it, a dashed line outlines a rectangular area labeled "beach". To the left of the beach, a vertical line with an arrow pointing down is labeled "drain pipe". To the right of the beach, a wavy line represents the ocean. Below the beach, a horizontal line is labeled "cluttered, leveled the area".

drain
pipe

beach

slimmers leveled the area

[illegible][illegible]

TRANSECT WORKSHEET - G. Chan
January, 1971

AT-4

Study Site DUXBURY REEF

Area A Section A Channel

Transect AT-4 Type 10m²

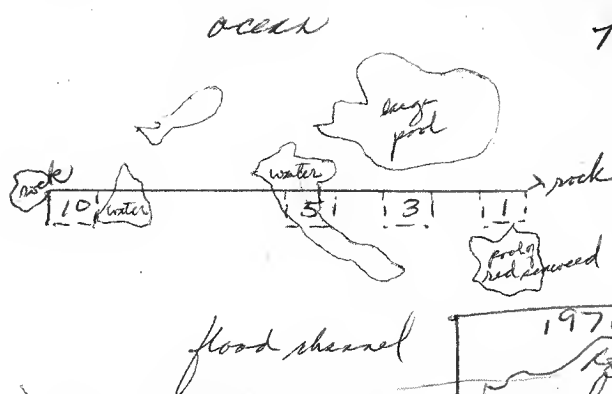
Other flood channel area

Agate Island; line laid across

ocean toward back of island

Reference

Investigator



For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 8/9 Tide/Time -0.20 12:30 AM Water temp. 12°C Other Air 9.5°C

Plot #	Oil?	Species=	Organism Count Size=Avg. mm. (S=shells with oil)								
			<i>Tegula funebralis</i>			<i>Alvinella</i>			<i>Polysiphonia</i>		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1		creat ridge <i>Giant</i>	10		48"	3			1		
2		<i>Iridea</i> + <i>Alor</i>	8			2			0		
3		"	2		1"	6			0		
4		"	5			3			2		
5		"	2			1			1		
6		+ <i>Microvelia</i>	2			1			2		
7		+ <i>Spergonompha</i>	5			2			0		
8		<i>Iridea</i> + <i>Alor</i>	1			1			0		
9		"	0			2			0		
10		"	2			3			1		
			37			24			7		

Year 1971 Date 11/16 Tide/Time 4:00 Water temp. 18°C Other clear

Plot #	Oil?	Species=	Organism Count Size=Avg. mm. (S=shells with oil)								
			<i>Popurus sp</i>			<i>Scaevola</i>			<i>Leptasterias</i>		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	0	<i>Gigartina</i>	6			1			1		
2		<i>Chloro</i>	3			2			0		
3		"	1			1			0		
4		"	2			0			1		
5		"	8			2			1		
6		"	4			1			0		
7		<i>Gastrodioxium</i>	1			1			0		
8		"	1			2			0		
9		"	2			3			0		
10		"	3			2			0		

6/30/12
Clear
Water 15°C
Air 20°C

me

TRANSECT WORKSHEET - G. Chan
January, 1971

AT-4

P2

Study Site AT-4
Area A Section Channel
Transect Type
Other

Reference

Investigator

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 71 Date 11/16 Tide/Time Water temp. Other 1 Depastoria

Plot #	Oil?	Species= Algae, other	Organism Count			Size=Avg. mm.			(S=shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	0	Gigartina cristata heavy.	10			1					
2	0		3			2					
3			1			1					
4			2			0					
5			8			2					
6			4			1					
7		Castrodorina	1			1					
8			1			2					
9			2			3					
10			3			1					

Not Galed.

Year 1972 Date 1/14 Tide/Time 0.9 @ 4:30 PM Water temp. Other

Plot #	Oil?	Species= Algae, other	Organism Count			Size=Avg. mm.			(S=shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	0	Gigartina 37g	4			2			4		
2		Unidentified heavy	5			2			2		
3			2			1			1		
4			1			1			1		
5			2			2			1		
6			1			2			1		
7			1			1			1		
8			3			1			1		
9			3			1			2		
10			1			1			1		

2 Composite 3"
1 Puschia 5"
7.1

inc

TRANSECT WORKSHEET - G. Chan
January, 1971

AT-4

p3

Study Site Duckburg

Area AT Section 4 Channel

Transect 7 Type

Other

Reference

Investigator Jim Elliott

Scott Bradley

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1972 Date 4-30 Tide/Time 0.5 9:30 Water temp. Other

Plot #	Oil?	Species= Algae, other	Organism Count Size=Avg. mm. (S=shells with oil)								
			<u>700</u>			<u>Acum</u>			<u>Litt</u>		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1			2			0			0		
2			2	2		0			0		
3			3			0			0		
4			6			0			0		
5			1	1		1			0		
6			2	1		0			1		
7			0			0			0		
8			1	1		1	1		1		
9			1			0			0		
10			0			1	1		1		
Total			18	5		3	1		3		

Year Date Tide/Time Water temp. Other

Plot #	Oil?	Species= Algae, other	Organism Count Size=Avg. mm. (S=shells with oil)								
			<u>MOP</u>			<u>Pagurus</u>					
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1			0			0					
2			0			0					
3			0			1					
4			0			3					
5			0			3					
6			0			2					
7			0			1					
8			0			2					
9			0			1					
10			0			0					
Total			0			13					

broken

Transect Worksheet

A-75

Year	Date	Tide	Other conditions	Plot, Strip	Description
1969	(8/1)			#1	20ty 1map 60cm section
				#2	20ty 10ty - 20cm section 5 poly
				#3	23ty 1map
				#4	30ty 8poly
				#5	20ty 16ty 20cm section
				#6	20ty 20cm section
				#7	30ty 10cm section 2poly
				#8	20ty 16ty 6cm section
				#9	20ty 3ty 10cm section 40poly
				#10	14ty 30poly
			Total	366	82ty 108ty 2map 10cm section 20cm section 86poly
1971	1/23	- D.R. 2:30 PM	90% cover OIL COVER TRANSECT	#1	20ty 0ty 2map 10cm section 9 Poly
				#2	10ty - - 5
				#3	2ty - 2map 3 15
				#4	4ty 1ty 5ty 5 -
				#5	- - 2map - -
				#6	- - 2map - -
				#7	2ty - 1map 2 2
				#8	1ty - - -
				#9	- - 1map - -
				#10	- - 1map - -
			Total	36	130ty 1ty 14map 17cm section 32poly
1971	4/2	0.2 2:11 PM A	90% cover OIL COVER TRANSECT 100% cover 100% cover 100% cover	#1	24ty 0ty 1map 10cm section 2 Poly
				#2	10ty - - 1
				#3	1 - 2 1 1
				#4	1 - 4 2 2
				#5	- - 3 - -
				#6	- - 10ty 2
				#7	1 - 2 1 1
				#8	1 - 3 1 1
				#9	- - - -
				#10	- - - -
			Total	365	135ty 25ty 5map 17cm section 180poly 10cm section

Study Site DOXBURY REEF

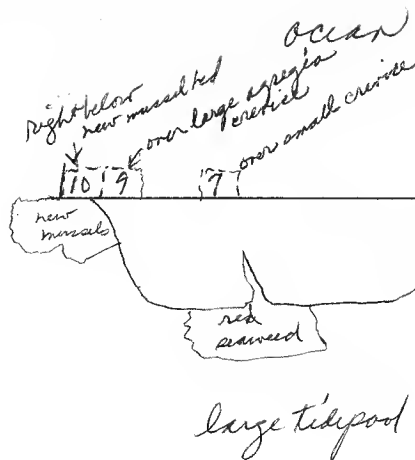
Area A Section Channel

Transect AT-5 Type 10m²

Other old mussel bed, line laid
parallel to shore, across old bed
to present bed

Reference _____

Investigator _____



For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 1/23 Tide/Time -0.8°C 3:18 PM Water temp. _____ Other _____

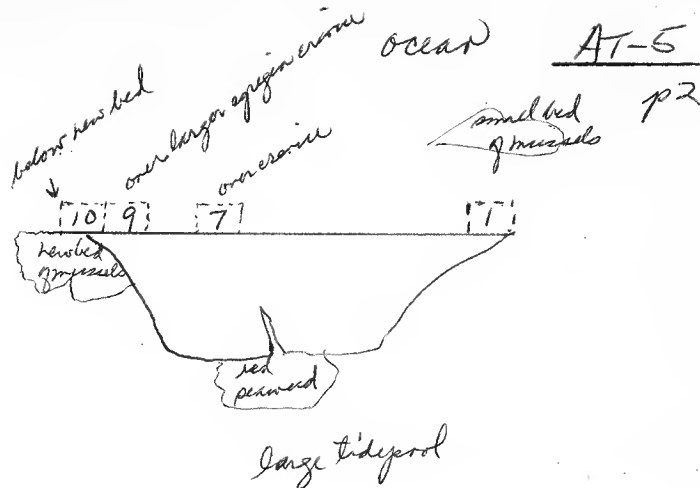
Plot #	Oil?	Species=	Organism Count Size=Avg. mm. (S=shells with oil)											
			<i>Mytilus californianus</i>			<i>Pollucija polynesiensis</i>			<i>Tequila funicularis</i>			<i>Mytilus peruvianus</i>		
		Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	globular	Acacia	20			9			0			0		
2			5	101		7			0			0		
3			3	2		15			1			2		
4			5	4		0			0			5		
5			0	0		0			0			2		
6			0	0		0			0			2		
7			3	2		2			0			1		
8			0	1		0			0			0		
9			0	0		0			0			1		
10			0	0		0			0			1		
Σ196			17	130		33			1			14		

Year 1971 Date 4/2 Tide/Time -0.2°C 11:42 AM Water temp. _____ Other _____

Plot #	Oil?	Species=	Organism Count Size=Avg. mm. (S=shells with oil)											
			<i>Mytilus californianus</i>			<i>Pollucija polynesiensis</i>			<i>Tequila funicularis</i>			<i>Mytilus peruvianus</i>		
		Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	globular	Acacia	1	2	24	1	25	45				1		
2			0	1	108	1	39	135				4		
3		Thryx	1	3		0						2		
4			3	2		0						4		
5			0	0		0						3		
6			0	0		0						3		
7			0	2		0						2		
8			0	1		0						1		
9			0	0		0						1		
10			0	0		0						4		
Σ365			5	17	135	180			0			25		

TRANSECT WORKSHEET - G. Chan
January, 1971

Study Site DUKBURY REEF
Area A Section Channel
Transect AT-5 Type 10m²
Other old mussel bed, line laid
parallel to shore, across old
bed to present bed
Reference _____
Investigator _____



For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 7/2 Tide/Time -1.0 @ 6:36 Water temp. 13.5° Other Dead Calanus messy shells

Plot #	Oil?	Species=	Organism Count			Size=Avg. mm.			(S=shells with oil)		
			Mytilus	Calanus	Pollicipes	Tagulus	Mytilus	Calanus	Pollicipes	Tagulus	Mytilus
1	+++	4 don't for Cal. old shell	296	14	60mm	290	0	42mm	7 (don't for Cal.)	7 (don't for Cal.)	3mm -
3	+	4 dead plus, long, 1 hair, 1 on shell	997	0	"	630	0	"	8.0 129.5 5mm	8.3 161.3S	16mm
4	+	AT-10	1078	0	70	521	0	60mm	36.3 58.8 3-4mm	9.0	

Year 1971 Date 8/9 Tide/Time -0.2 @ 7:15 Water temp. 12°C Other 9.5°C apr

July count not used

Plot #	Oil?	Species=	Organism Count			Size= Avg. mm.			(S=shells with oil)		
			Mytilus	Tag	Acrop	Pollicipes	Mytilus	Tag	Acrop	Pollicipes	Mytilus
1	+	1 Heptasterias	19	2	31	154					
2	N	2 Hept 34mm	98	4	23	138					
3	+	2	0	0	15	0					
4	+	1 Katharina 8mm	0	2	12	0					
5	+	6	0	1	38	0					
6	+	Bal 8	0	0	28	0					
7	+	2	0	0	17	0					
8	+	1 Hept 2	0	1	18	0					
9	+	1	0	1	18	0					
10	+	1 P. 64 Bal 1	0	0	20						
Σ 673			27	117	220	292					

1 2 3 4
5 6 7 8
9 10 11 12

dim² patten
1 2 3 4
12 13 14 5
11 16 15 6
10 9 8 7

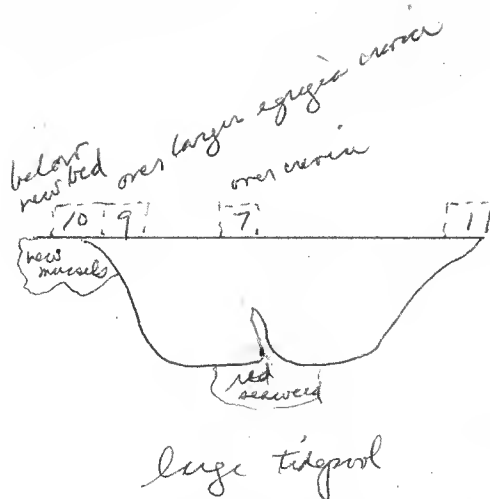
5mm
7/22 Bal acm oth
m²1-2 +++ ~~10~~ 17 1 meg 35mm
4 +++ 20, 22 1 1 Toniselle
6 + 0, 24 5 5 1 Kist plan
10 +++ 12, 38 10 3 Kist plan

32, 57 8D 33 ac 4 Kist plan
(24 5) 1 meg
1 Kist
1 Toniselle

Bal acm
m²3-2 39, 10 7
4 +++ 57, 72 12
6 + 29, 118 6
10 +++ 26, 44 11 1 X. acut
145, 235 36 1 X. acut

m²4-2 11 Bal casting hgt, acm
4 + phell mitch 2 1 Kist
6 + 31 Bal (100) m hgt 5
10 N 21 Bal (70) m hgt 15 2 Kist 6mm
2 Toniselle

Study Site DOXBURY REEF
Area A Section Channel
Transect AT-5 Type 10m²
Other old mussel bed, line
 laid parallel to shore,
 across old bed to new bed
Reference
Investigator



For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 1/16 Tide/Time 4:00 Water temp 18°C Other clear

		Organism Count Size=Avg. mm. (S=shells with oil)													
Plot #	Oil?	Species= Algae, other	Mytilus			Pallidipes			Acan spp			Mopalia			
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	
1	+	Corallina (heavy)	26	0	1 1/2"	64			47	0		2			
2	+	} also Littorina + Pulmona	120	0	2"	41			53			5			
3	++			0			0			23			2		
4	++									15			2		
5	++									71			1		
6	++								14			1		Katharina	
7	++								12			1		tunicata	
8	++	→ (2400 Littorina)							22						
9	++	+ Endolobus							26			—			
10	0	+ E. l. + D. l.	0			0			8			—			

Year 1972 Date 6/30 Tide/Time Water temp. Other

FULL m ² of BAL ★			Organism Count Size= Avg. mm. (S=shells with oil)											
Plot #	Oil?	Species= Algae, other	MYTILUS			POLLICIPES			ACANSEA			MOPALIA		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	0	ANY TEG? BAL	12			82			50			4		
2	0	ANY	125			146		(many small)	122		many small	2		
3			2			0			95		a. asai	2		
4		algae							52			1		
5		Corallina							66			3		
6									39			1		
7									45			2		
8									100			1		
9									84			0		
10									21			0		

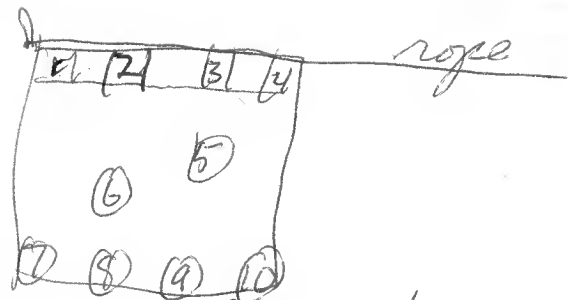
★ of Bal extremely numerous, 10 den² in each m², note dead especially

Vme

Balances

4 small in
all 1-2 mm

DM²



M ²	1	2	3	4	5	6	7	8	9	10
1	89L 4D	75L 2D	180L 4D	52L	102L 1D	23L	6L	4L	3L	4L
2	54L 1D	350L 8D	1200L 10D	670L 12D	54L 1D	2L	3L	1L	0L	0L
3	290L 6D	89L 1D	45L 1D	120L 8D	0	10L	0	0	0	0
4	206L 5D	28L 1D	30L 2D	25L	0	Coralline & ultra coverage				
5	22L 1D	68L 1D	20L	5L	12L	0	0	0	0	0
6	88L 2D	15L 10D	117L 10D	155L 16D	120L 28D	0	0	0	0	0
7	77L 5D	211L 23D	15L 6D	88L 2D	20L 25D	0	0	0	0	0
8	55L 3D	510L 6D	406L 2D	70L 3D	7L 2D	108L 11D	0	0	0	0
9	96L 2D	102L 6D	22L 1D	110L 6D	0	0	0	0	0	0
10	77L 6D	12L 1D	5L	3L	0	3L 4D	0	0	0	0

TRANSECT WORKSHEET - G. Chan
January, 1971

AT-5

p4

Study Site AT-5
Area A Section Channel
Transect Type
Other

Reference

Investigator

Mytilus growing thick in AT-6 = looks healthy!

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 11/16/71 Tide/Time Water temp. 18°C Other Clear weather

Plot #	Oil?	Species=	Organism Count			Size=Avg. mm.			(S=shells with oil)		
			<i>Mytilus</i>			<i>Pollicipes</i>			<i>Acanthina</i> spp.		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
✓ 1	+	Corallina (heavy)	26	0	1 1/2"	64			47	0	
✓ 2	+	" + heavy with	120	0	2 1/4"	41			53		
3	++	" Rallia							23		
4	++	" + P. lora							15		
5	++	No Tegula nor Littorina							71		
6	++	few Tegula in other deep pool							14		
7	++								12		
8	+								22		
9	+	+ Eucodadia							26		
10	0	+ Linder							8		

Year 1972 Date 1/14 Tide/Time 9:40 PM Water temp. Other Slight clear

Plot #	Oil?	Species=	Organism Count			Size=Avg. mm.			(S=shells with oil)		
			<i>Mytilus</i>			<i>Pollicipes</i>			<i>Acanthina</i> spp.		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
✓ 1	0	Corallina (heavy)	26			64			47	0	
✓ 2	+	" only	93			80			53		
3	+	" only							28		
4	+	" Rallia							16		
5	+	2 TEGS	1						20		
6	+								31		
7	+								12		
8	+								15		
9	+	Eudo							20		
10	+	"							8		

1 thing to me

TRANSECT WORKSHEET - G. Chan
January, 1971

AT-5
p5

Study Site Dunbury

Area AT Section 5 Channel —

Transect X Type 10 dm²/m² for

Other BAC only,

fuel m² for other

Reference —

Investigator Jim Elliott, Scott Bradley

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 72 Date 4/19 Tide/Time 10:30-26 Water temp. — Other —

Plot #	Species=		Organism Count Size=Avg. mm. (S=shells with oil)								
			*Ba1 Zibda			Pol			Tea		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	Oil?	Algae, other	224	5		41	—		1	—	avg
2			120			191	—		0	—	
3			261	8		11	—		2	—	avg
4			187			0	—		0	—	
5			207	9		0	—		0	—	avg
6			223			0	—		0	—	
7			364			0	—		0	—	
8			292			0	—		0	—	
9			208			0	—		0	—	avg
10			115			0	—		0	—	avg
total			2201	24		243			4		56

Year — Date — Tide/Time — Water temp. — Other —

Plot #	Species=		Organism Count Size=Avg. mm. (S=shells with oil)								
			MUT			MOP					
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	Oil?	Algae, other	15	0	avg	0	0	—			
2			82	0	avg	0	0	—			
3			0	0	—	3	0	avg			
4			3	0	avg	0	0	—			
5			0	0	—	2	0	avg			
6			0	0	—	0	0	—			
7			0	0	—	1	0	avg			
8			0	0	—	2	0	avg			
9			0	0	—	1	0	avg			
10			0	0	—	3	0	avg			
total			100			12					

make

1-5
AT-5
p 6

Ocean

211

beach

Reference

Investigator _____

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

Year Date Tide/Time Water temp. Other

			Organism Count Size= Avg. mm. (S=shells with oil)																	
Species=			Live			Dead			Live			Dead			Live			Dead		
Plot #	Oil?	Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size			

7/22

12 3 4
12 13 14
11 12 15 6
10 9 8 7

	Bal	acn	
m ² / 2 +++	100	17	1 map
4 ++	20,280	1	1 test plan
6 +	0,245 DS	5	1 this
10 ++++	12,380	10	3 test plan
	326,518	33 hon	
	(245)		

	Bal		
m ² 3-2 N	39, 10	7	
4 +++	51, 720	12	
6 +	29, 1180	6	
10 +++	26, 440	11	1 test out
	145,235	36 acn	

		acn	
m ² 4-2 + Bal coating	myt,	2	1 this
4 +	31 Bal (160) m/myt	5	
6 +	21 Bal (70) m/myt	15	2 this
10 N	!	7	2 mi

TRANSECT WORKSHEET - G. Chan
January, 1971

AT-6

p2

Study Site Dunbury

Area AT Section 6 Channel

Transect x Type 10 dm²/m² for BAC only

Other fuel m² for others

Reference

Investigator Jim Elliott, Scott

Bradley

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 72 Date 4/19 Tide/Time 06 10:30 Water temp. Other

Plot #	Oil?	Species= Algae, other	Organism Count			Size=Avg. mm. (S=shells with oil)								
			* Ba	1	10 dm ²	PO			ACM			LH		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1			229			183			31			0		
2			359			233			19			0		
3			246			185			24			0		
4			442			295			13			0		
5			570	33		326			6			0		
6			424	25		409			12			0		
7			271	50		146			7			0		
8			320	18		296			10			0		
9			137	6		25			5			0		
10			223	6		0			8			0		
total			3,221	138		2,098			130			0		

Year Date Tide/Time Water temp. Other

Plot #	Oil?	Species= Algae, other	Organism Count			Size= Avg. mm. (S=shells with oil)								
			MOP			MYT								
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1			0			318	12	avg						
2			0			547	7	"						
3			0			355	0	"						
4			0			627	16	"						
5			0			218	0	"						
6			0			284	0	"						
7			0			138	3	"						
8			3		avg	12	0	"						
9			1		sm	0	0	"						
10			1		sm	0	0	"						
total			5			2,499	38							

me

1-7
A7-7
yb

Area A Section Channel

Transect AT-7 Type gm²

Other close to base of cliff

inner 4 feet high, 00

Cost of vertical crash

Reference

Investigator _____

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

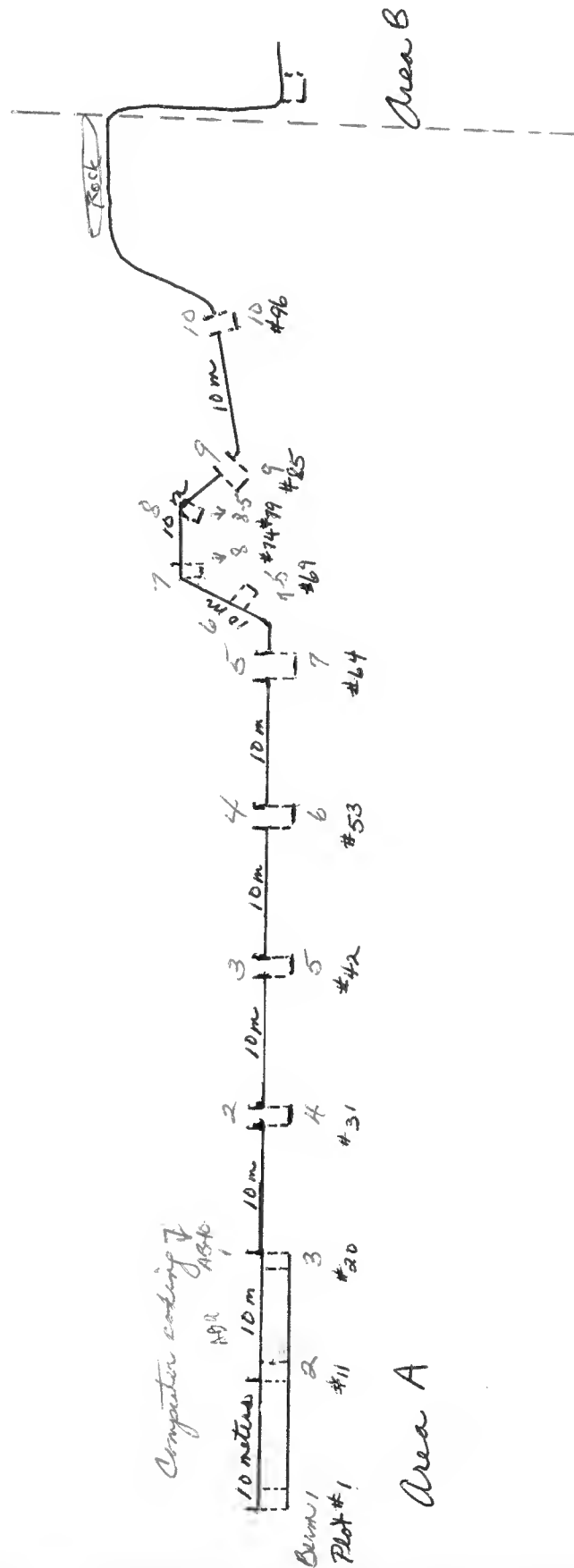
Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

Location of Area A square meter sample plots
High Tide Berms 1 through 10
Duxbury Reef



Area 8

2015



ARE

AB-10

Berm 3A

Location:

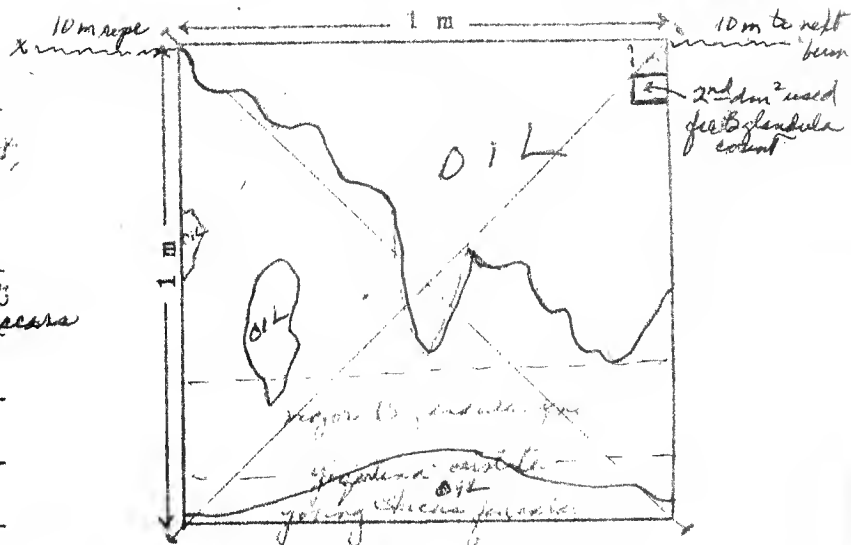
 Area A Section 3 Plot # 20

 Other 2.6 m SE of previous station

Log:

same plot as #20 of Berm 2

	Year	Date	Tide, Time	Other Conditions
1.	1971	4/28	-1.5 8:06 AM	oil deposits as shown; number dead includes acacia
2.				
3.				
4.				


 Memo count only: S = shells covered with oil; ~~S~~S = shells with oil, on top of oil

~~N~~S = shells with no oil, on top of oil

 Place in parentheses (no. of shells covered w oil = S, no. of shells on top of oil = ~~S~~S, ~~N~~S)

CATEGORY	<u>Acmaea digitalis</u> Total (S - S S) N	<u>Acmaea scabra</u> Total (S - S S) N	<u>Littorina scutulata</u> Total (S - S S) N	<u>Balanus glandula</u> Total (S ₂ - S S) ONE DM ² N	Other organisms, Changes in oil residue, algal growth, etc.
1. Live	47 (85-0)	4 (25-0)	401 (0-40NT)	15	
Dead	23 (135)	0	18 (185)	267 (2675)	
Total-m ²	70 (315-0)	4 (25-0)	419 (185-40NT)	282 (2675)	
\bar{X} size and range	10 mm mm.	10 mm mm.	4 mm mm.	4 mm width mm.	
2. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
3. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
4. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	

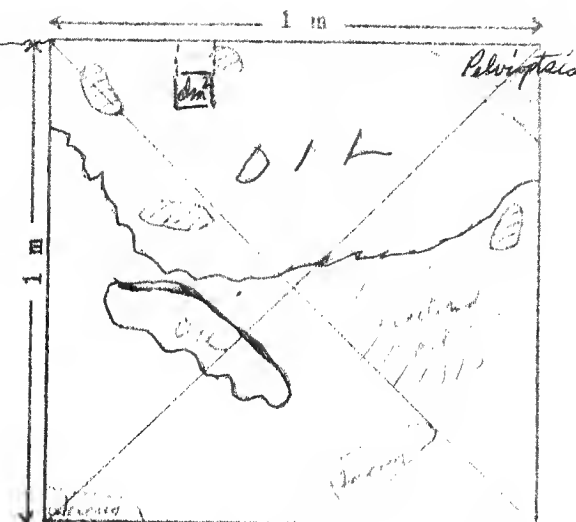
Location:

 Area A Section Berra 4 Plot# 31

 Other 10m column end of Berra 3 and start of Berra 4

Log:

	Year	Date	Tide, Time	Other Conditions
1.	1971	4/8	-1.5 8:00 AM	oil
2.				
3.				
4.				


 Memo count only: S = shells covered with oil; S₂ = shells with oil, on top of oil
 N₂ = shells with no oil, on top of oil

 Place in parentheses (no. of shells covered w oil=S, no. of shells on top of oil=S₂, N₂)

CATEGORY	<u>Acmaea digitalis</u> Total (S -S ₂) N ₂	<u>Acmaea scabra</u> Total (S -S ₂) N ₂	<u>Littorina scutulata</u> Total (S -S ₂) N ₂	<u>Balanus glandula</u> Total (S ₂ -S ₂) ONE DM N ₂	Other organisms, Changes in oil resi- due, algal growth, etc.
1. Live	160 (25-135)	10 (0-0)	783 (0-683)	8	
Dead	31 (31S)	0	86 (86S)	83 (83S)	
Total-m ²	191	10	869	91	
\bar{X} size and range	13 mm.	13 mm.	4 mm. 8 mm.	4 mm. 8 mm.	
2. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
3. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
4. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	

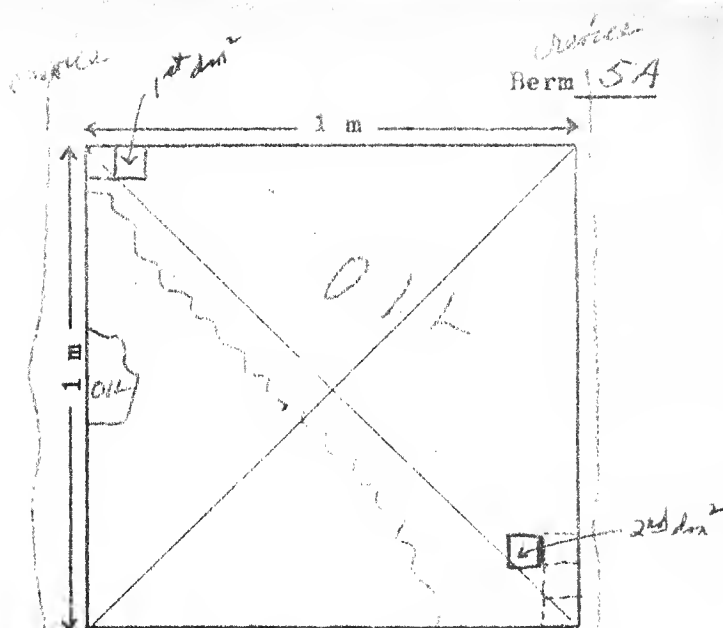
Location:

Area A Section 5 Berm 5 Plot # 12

Other 10m between end of Berm 4 and start of Berm 5

Log: part of m² plot in CREVICE

Year	Date	Tide, Time	Other Conditions
1. 1971	4/28	-1.5 8:00 AM	OIL
2.			
3.			
4.			


Memo count only: S = shells covered with oil; S₂ = shells with oil, on top of oil

N₂ = shells with no oil, on top of oil

Place in parentheses (no. of shells covered w oil = S, no. of shells on top of oil = S₂, N₂)

CATEGORY	<u>Acmaea digitalis</u> Total (S - S ₂) N ₂	<u>Acmaea scabra</u> Total (S - S ₂) N ₂	<u>Littorina scutulata</u> Total (S - S ₂) N ₂	<u>Balanus glandula</u> Total (S ₂ - S ₂) ONE DM ² N ₂	Other organisms, Changes in oil resi- due, algal growth, etc.
1. Live	16 (25-0)	6 (25 0)	219 (0-8 NT)	0 2	
Dead	12 (125)	3 (35)	25 (25)	12 + 68 = (705)	
Total-m ²	28 (145-0)	9 (55-0)	244 (255-8 NT)	12 + 66 = 72 m ²	
\bar{X} size and range	13 mm mm.	5 mm mm.	3 mm mm.	3 mm mm.	
2. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
3. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
4. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	

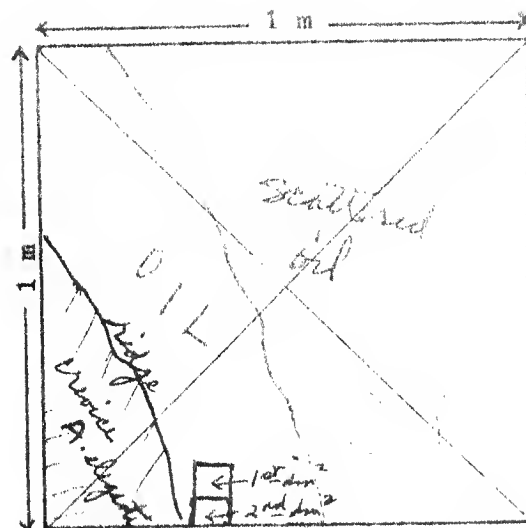
Location:

Area A Section Berm 6 Plot 53

Other 10 m from end of Berm 5 to West

Log:

	Year	Date	Tide, Time	Other Conditions
1.	1971	4/27	-1.5 8:06 AM	Oil
2.				
3.				
4.				


Memo count only: S = shells covered with oil; ~~SS~~ = shells with oil, on top of oil
~~NT~~ = shells with no oil, on top of oil

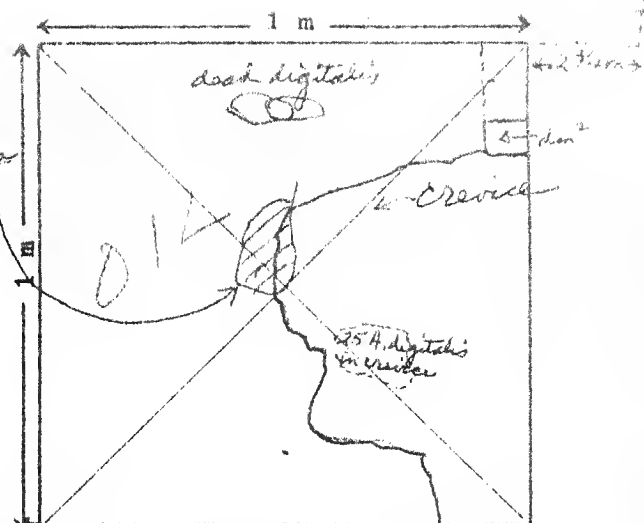
Place in parentheses (no. of shells covered w oil=S, no. of shells on top of oil=~~SS~~, ~~NT~~)

CATEGORY	<u>Acmaea digitalis</u> Total (S - SS) NT	<u>Acmaea scabra</u> Total (S - SS) NT	<u>Littorina scutulata</u> Total (S - SS) NT	<u>Balanus glandula</u> Total (S ₂ - SS) ONE DM NT	Other organisms, Changes in oil resi- due, algal growth, etc
1. Live	62 (55-0)	4 (0-0)	148 (0-14NT)	3 12-15	5 healthy A. digitalis in lower left corner - young, 1/4" antinatal size (19mm)
Dead	2 (25)	0	14 (14S)	621 75+137S	
Total-m ²	64 (75-0)	4 (0-0)	162 (14S-14NT)	65 + 89 = 152	
\bar{x} size and range	13mm mm.	19mm mm.	3mm mm.	2mm 1mm very small mm.	
2. Live					
Dead					
Total-m ²					
\bar{x} size and range	mm.	mm.	mm.	mm.	
3. Live					
Dead					
Total-m ²					
\bar{x} size and range	mm.	mm.	mm.	mm.	
4. Live					
Dead					
Total-m ²					
\bar{x} size and range	mm.	mm.	mm.	mm.	

Location:

Area A Section Berm 7 Plot 64Other 10 m from end of Berm 7Log: End of Berm 7 is 2 3/4 m from corner

	Year	Date	Tide, Time	Other Conditions
1.	1971	4/28	-1.2 B. 6 AM	oil rounded pear oiled
2.				
3.				
4.				

Enteromorpha
intertexturalisPithella
disposita
16'

Memo count only: S = shells covered with oil; ~~SS~~ = shells with oil, on top of oil
 N = shells with no oil, on top of oil

Place in parentheses (no. of shells covered w oil=S, no. of shells on top of oil=SS, NS)

CATEGORY	<u>Acmaea digitalis</u> Total (S - SS) N	<u>Acmaea scabra</u> Total (S - SS) N	<u>Littorina scutulata</u> Total (S - SS) N	<u>Balanus glandula</u> Total (S - SS) ONE DM ² N	Other organisms, Changes in oil resi- due, algal growth, etc.
1. Live	36 (55 - 0)	210 (0)	104 (0 - 23NT)	100	Thin film of Rhodospirillum sp. on 1/4 m from end of Berm 7
Dead	26 (26S)	2 (2S)	12 (12S)	4 (4S)	
Total-m ²	62 (26S - 0)	4 (2S - 0)	116 (12S - 23NT)	104 (3S)	P. massigianus, just 1, in crevice, 25 mm diameter
\bar{X} size and range	13 mm mm.	13 mm mm.	3 mm mm.	3 mm mm.	
2. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
3. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
4. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	

DIURNAL BERM WORKSHEET - G. Chan

Berm
7

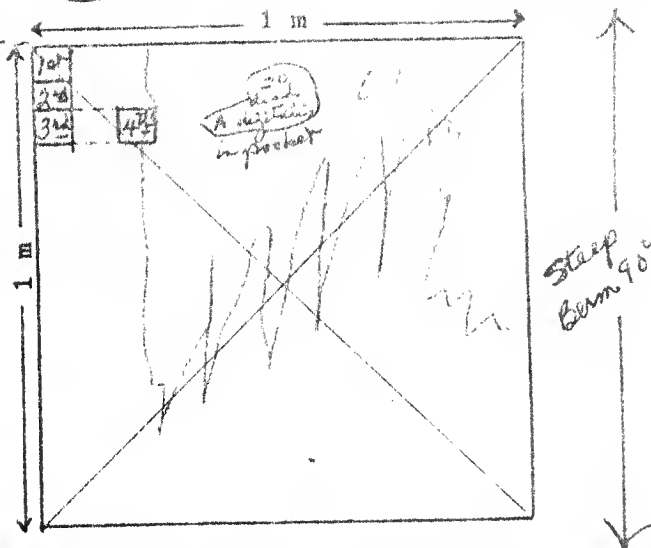
tidy pro

Berm 7-5A

Location:

Area A Section Berm 7-5 Plot # 19
Other 5th square meter plot from end of berm 7
Log: four 1m² samples for B. fundul

	Year	Date	Tide, Time	Other Conditions
1.	1971	4/28	-1.2 8:00 AM	oil
2.				
3.				
4.				



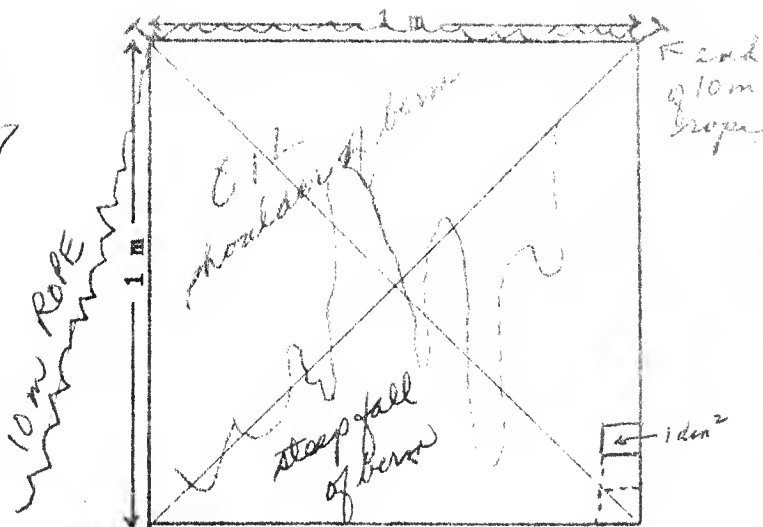
Memo count only: S = shells covered with oil; ~~SS~~ = shells with oil, on top of oil
NT = shells with no oil, on top of oil
Place in parentheses (no. of shells covered w oil = S, no. of shells on top of oil = ~~SS~~, NT)

CATEGORY	<u>Acmaea digitalis</u> Total (S - SS) NT	<u>Acmaea scabra</u> Total (S - SS) NT	<u>Littorina scutulata</u> Total (S - SS) NT	<u>Balanus glandula</u> Total (S - SS) ONE DM ² NT	Other organisms, Changes in oil resi- due, algal growth, etc.
1. Live	44 (45 - 0)	4	85	85 11 140 61	4 th dm ² = 48 NT
Dead	97 (918)	1	32 (425)	190	of the 131 live = 4 NT
Total - m ²	141 (1015 - 0)	5 (0 - 0)	117 (325 - 0)	655 175 1408 92	of the 67 dead = 19 NT as noted in the
\bar{X} size and range	13 mm 7 mm - 19 mm	13 mm	7 mm 3 mm - 8 mm	3 mm	48S died from oil
2. Live					
Dead					
Total - m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
3. Live					
Dead					
Total - m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
4. Live					
Dead					
Total - m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	

Location:

Area A Section Berm 8 Plot# 14Other 10th seaward meter from end of berm 7Log: plot by 10th seaward meter from end of berm 7

	Year	Date	Tide, Time	Other Conditions
1.	1971	4/28	-1.2 9:06 AM	CIL
2.				
3.				
4.				



Memo count only: S = shells covered with oil; S₂ = shells with oil, on top of oil
 N₂ = shells with no oil, on top of oil

Place in parentheses (no. of shells covered w oil=S, no. of shells on top of oil=S₂, N₂)

CATEGORY	<u>Acmaea digitalis</u> Total (S - S ₂) N ₂	<u>Acmaea scabra</u> Total (S - S ₂) N ₂	<u>Littorina scutulata</u> Total (S - S ₂) N ₂	<u>Balanus glandula</u> Total (S ₂ - S ₂) ONE DM N ₂	Other organisms, Changes in oil residue, algal growth, etc.
1. Live	0	0	6	38	film of algal growth
Dead	7 (7S)	0	10 (10S)	1N (oil)	
Total-m ²	7 (7S)	0	16 (10S)		
\bar{x} size and range	13mm mm.	mm.	7mm mm.	3mm mm.	
2. Live					
Dead					
Total-m ²					
\bar{x} size and range	mm.	mm.	mm.	mm.	
3. Live					
Dead					
Total-m ²					
\bar{x} size and range	mm.	mm.	mm.	mm.	
4. Live					
Dead					
Total-m ²					
\bar{x} size and range	mm.	mm.	mm.	mm.	

Location:

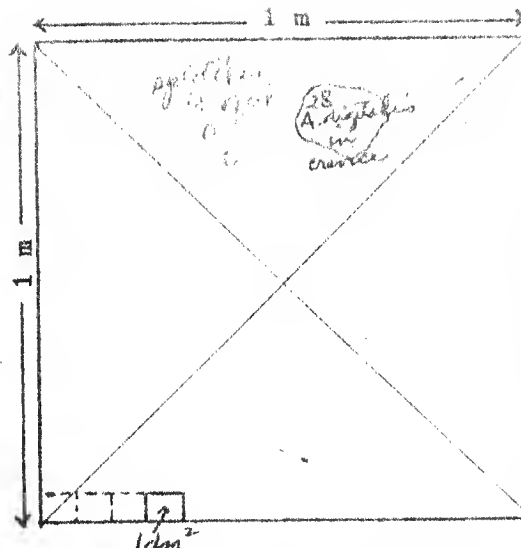
Area A Section Berm 8-5 Plot# 19

Other 5th square water plot from end of Berm 8

Log:

	Year	Date	Tide, Time	Other Conditions
1.	1971	4/29	-1.5 8:00 AM	NO OIL except a few 1" apertures
2.				
3.				
4.				

free bands both in under berm



Memo count only: S = shells covered with oil; S₂ = shells with oil, on top of oil
N₂ = shells with no oil, on top of oil

Place in parentheses (no. of shells covered w oil=S, no. of shells on top of oil=S₂, N₂)

CATEGORY	<u>Acmaea digitalis</u> Total (S -S ₂) N ₂	<u>Acmaea scabra</u> Total (S -S ₂) N ₂	<u>Littorina scutulata</u> Total (S -S ₂) N ₂	<u>Balanus glandula</u> Total (S ₂ -S ₂) ONE DM N ₂	Other organisms, Changes in oil resi- due, algal growth, etc.
1. Live	127		468	168	Some pithoria on 4th day updrage. NAKS SPRAWLED
Dead	0		0	0	
Total-m ²	127		468	168	
\bar{X} size and range	16mm mm.	mm.	3mm mm.	2mm mm.	
2. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
3. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
4. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	

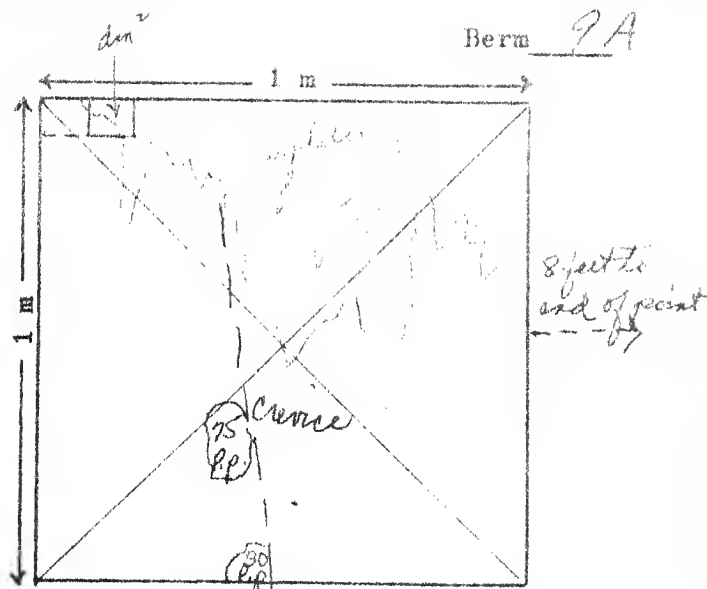
Location:

Area A Section 7 Berm 9 Plot/ 85

Other 10 m. from end of Berm 8 to start of Berm 9

Log:

Year	Date	Tide, Time	Other Conditions
1. 1971	4/28	-1.5 8:06 AM	CIL, spl. techy
2.			
3.			
4.			



Memo count only: S = shells covered with oil; SS = shells with oil, on top of oil

NS = shells with no oil, on top of oil

Place in parentheses (no. of shells covered w oil=S, no. of shells on top of oil=SS, NS)

CATEGORY	<u>Acmaea digitalis</u> Total (S -SS) NS	<u>Acmaea scabra</u> Total (S -SS) NS	<u>Littorina scutulata</u> Total (S -SS) NS	<u>Balanus glandula</u> Total (S -SS) ONE DM ² NS	Other organisms, Changes in oil residue, algal growth, etc.
1. Live	92 (10S-0)	19	69 (4S-0)	33	2.0 algae
Dead	18 (18S)	1	6 (6S)	87 (8S)	105 1' polymeric
Total-m ²	110 (28S-0)	20	75 (10S-0)	120 (8S)	not much feces
\bar{x} size and range	16 mm mm.	13 mm mm.	4 mm mm.	1 mm mm.	26 mm stalk height
2. Live					
Dead					
Total-m ²					
\bar{x} size and range	mm.	mm.	mm.	mm.	
3. Live					
Dead					
Total-m ²					
\bar{x} size and range	mm.	mm.	mm.	mm.	
4. Live					
Dead					
Total-m ²					
\bar{x} size and range	mm.	mm.	mm.	mm.	

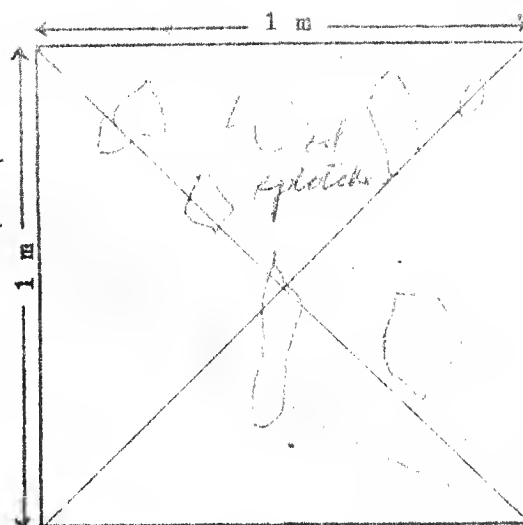
Location:

Area A Section Berm 10 Plot 96

Other: In core, last m² plot in Berm in A

Log: BARREN m², high up inside core

	Year	Date	Tide, Time	Other Conditions
1.	1971	4/28	-1.5 8:00 AM	OIL SPLASHES
2.				
3.				
4.				



Memo count only: S = shells covered with oil; ~~SS~~ = shells with oil, on top of oil
~~NS~~ = shells with no oil, on top of oil

Place in parentheses (no. of shells covered w oil=S, no. of shells on top of oil=~~SS~~, ~~NS~~)

CATEGORY	<u>Acmaea digitalis</u> Total (S - SS) N S	<u>Acmaea scabra</u> Total (S - SS) N S	<u>Littorina scutulata</u> Total (S - SS) N S	<u>Balanus glandula</u> Total (S - SS) ONE DM ² N S	Other organisms, Changes in oil residue, algal growth, etc. <u>BARREN, no algae</u> <u>Littorina plus 4</u>
1. Live	3 (0-0)		21 (0-0)		
Dead	0		0		
Total-m ²	3		21		
\bar{X} size and range	13 mm mm.	mm.	mm.	mm.	
2. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
3. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	
4. Live					
Dead					
Total-m ²					
\bar{X} size and range	mm.	mm.	mm.	mm.	

1-8
AB 8+9 9

p3

Area A Section ^{High tide} berm Channel

Other shell m² counts for all

except Balanus & Chthamalus
which should be counted by 10 dm²

Reference (random) in each m^2

Investigator _____

use this for summary
of term worksheets

total
h oil) 100

[illegible]

record on
back -

[illegible]

100 dm²

Balanus
+ *Chthamalus*

$\frac{m^2}{1}$	$\frac{dm^2}{1}$	<u>Live</u>	<u>Dead</u>
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		

$\frac{m^2}{2}$	
11	
12	
13	

140
AB-10
p3

see separate
penn worksheets

[illegible]

100 dm²

Balanus
x *Chthamalus*

m² dm² Live Dead

1 - 1

2

3

4

5

6

7

8

9

10

2 - 11

12

13

14

15

16

AS-1)

75

← alternate m²
pool 1111 stake #1

enrich

stake #1

fuel m² counts

term

771111111

Year	Date	Tide/Time	Water temp.	Other
------	------	-----------	-------------	-------

Organism Count	Size-Avg. mm.	(S=shells with oil)
1	1.5	
2	1.5	
3	1.5	
4	1.5	
5	1.5	
6	1.5	
7	1.5	
8	1.5	
9	1.5	
10	1.5	
11	1.5	
12	1.5	
13	1.5	
14	1.5	
15	1.5	
16	1.5	
17	1.5	
18	1.5	
19	1.5	
20	1.5	
21	1.5	
22	1.5	
23	1.5	
24	1.5	
25	1.5	
26	1.5	
27	1.5	
28	1.5	
29	1.5	
30	1.5	
31	1.5	
32	1.5	
33	1.5	
34	1.5	
35	1.5	
36	1.5	
37	1.5	
38	1.5	
39	1.5	
40	1.5	
41	1.5	
42	1.5	
43	1.5	
44	1.5	
45	1.5	
46	1.5	
47	1.5	
48	1.5	
49	1.5	
50	1.5	
51	1.5	
52	1.5	
53	1.5	
54	1.5	
55	1.5	
56	1.5	
57	1.5	
58	1.5	
59	1.5	
60	1.5	
61	1.5	
62	1.5	
63	1.5	
64	1.5	
65	1.5	
66	1.5	
67	1.5	
68	1.5	
69	1.5	
70	1.5	
71	1.5	
72	1.5	
73	1.5	
74	1.5	
75	1.5	
76	1.5	
77	1.5	
78	1.5	
79	1.5	
80	1.5	
81	1.5	
82	1.5	
83	1.5	
84	1.5	
85	1.5	
86	1.5	
87	1.5	
88	1.5	
89	1.5	
90	1.5	
91	1.5	
92	1.5	
93	1.5	
94	1.5	
95	1.5	
96	1.5	
97	1.5	
98	1.5	
99	1.5	
100	1.5	

[illegible]

Organism Count. Size= Avg. mm. (S=shells with oil)

[illegible]

check Bal S + Z + S
in #3 + #5

AS-11
oil
++++

3/18/71

	Leg	A. de	Bal	Mag	Acn	Zit	hgt	Poli	Other
++++1	0	0	110S	0	{40LS 4DS	3LS	17LS	61LS, 6DS	
+3	36	57	75S	2	3LS	0	0	0	
+5	26	52	20S	1	0	15LS	0		
+7	8	17	0	0	0	0	0		1 Pay - lay shell
+9	35	2	0	0	0	0	0	0	4 this
									9 Pymus
									7 this
Σ	105	128	205S	3	43LS 4DS 42S	50LS	17LS	61LS, 6DS	10 Pay 11.7 this

4/12/71

	Leg	A. de	Bal	Mag	Acn	Zit	hgt	Poli	Other
++++1	0	0	107S	0	41LS	37LS	16LS	61LS 596DS	
+3	31	54	72S	1	0	0	0	0	
+5	26	53	17S	0		17LS			
+7	14	13	0	0		0			1 this
+9	41	2	0	0	0	0	0	0	5 this
Σ	112	122	201LS	1	41LS	54LS	16LS	61LS 596DS	6 Pay 6 this

DO 4/23/71 FIRST

4/23/71 5/11/71

	Leg	A. de	Bal	Mag	Acn	Zit	hgt	Poli	Other
++++1	0	0	113S	0	29LS	38S	13S	615LS 495DS	
+3	32	53	83S	1	1S	0	0	0	1 this
+5	23	54	16S	0	0	10S			1 acc
+7	18	11	0	0	0	0			2 this
+9	43	2	0	0	0	0	0	0	1 acc, 3 Pay
Σ	116	120	212S	1	30 ⁹ 29	48 5	13LS	615LS 495DS	5 this 5 Pay 8 this 3 acc, 8 Pay

DO 5/27/71 NEXT

~~4/1/71~~ 4/23/71

Y?

leg A de Bal mag dem Zeit mag Polli Other

++++1	0	0	113S	0	32S	35S	13S	49S 49S	
+3	28	49	87S	1	0	0	0	0	
+5	23	24	84	17S	0	12S			1 This
+7	18	19	16	0		0			1 This
+9	48	45	2	0	0	0	6	0	1 Ocean 1 Pay
Σ	116	116	129	172	1	32S	47S	13S	5 This 8 Pay

20 5/11/71 NEXT
5/27/71

++++1	0	0	117S	0	29S	35S	13S	52S 52S	
+3	35	55	81S	1	1S		0	0	1 This
+5	21	57	16S	0		9S			2 Ocean
+7	20	13	0						1 This
+9	45	2	0	0			0	6	3 Ocean 1 Pay
Σ	121	121	214S	1	30S 30S	44S	13S	52S 52S	6 This 6 Pay

++++1	0	0	118S	0	29S	36S	13S	52S 52S	
+3	37	54	82S	1	1S		0	6	1 This
+5	24	49	16S	0		9S			2 Ocean
+7	21	12	0	0					1 This
+9	46	2	0	0			6	0	3 Ocean 2 Pay
Σ	128	117	216S	1	30S 30S	45S	13S	52S 52S	7 This 1 Pay

3/22/71

A

Teg. ale Bal Prop Acen Lict Myx Polli Other

444/ none? none? 0 none? 0 0 none? none?

+ 3

0

0

0

+ 5

~~40~~
24

4

174

2 Amphipods

+ 7

0

0

229

+ 9

246

325

62

450

1 Hemigrapsus
 7 of 4/nd tigrinus eel
 longish masses of
 80 cirriformia

Σ

286
70/39

66

853

DATA SUMMARY for Study Site DUXBURY REEF Transect AS-12 Oil? ☒ n= 3m² p. 1

L= live
D= dead; += scars
S= oil on shells
T= on top of oil
N= no oil on shells

		Organisms	<i>Acansea</i> ppf.	<i>Myopodia</i> muscosa	<i>Regulus fenestratus</i>	<i>Littorina</i>	<i>Galathea</i>		
Year	Date		per m ²	per m ²	per	per	per	per	per
1962	5/30	\bar{X}/unit	6.0	15					
-0.9		$2\text{m}^2 \Sigma$	12	3					
4:38 PM		size							
		change							
1971	7/22	\bar{X}/unit	2.6/dm ²	0	1.5/dm ²	2.4/dm ²	18.35/16.07	1 longipod	
++++		$32\text{dm}^2 \Sigma$	31+2D		18+4D	29	625 9.75	3 hyt	
		in 3m ² size			0.3/dm ²		220L 192D	16 mths	
		change					(45) (1165)		
1971	8/10 + 8/12	\bar{X}/unit	1.9/dm ²	0	1.3/dm ²	0.5/dm ²	1.5/0.85/11.2D	1 thais	
		$32\text{dm}^2 \Sigma$	60		42	17	49L 358D	2 hyt	
		in 3m ² size					(265) (2255)	9A ele	
		change					4D on		
							Rafines		
		\bar{X}/unit							
		size							
		change							
		\bar{X}/unit							
		size							
		change							
		\bar{X}/unit							
		size							
		change							
		\bar{X}/unit							
		size							
		change							
		\bar{X}/unit							
		size							
		change							

ALL dm² samples

AS-12
oil
2m²
12 dm² in #1
10 dm² in #2 & #3

7/22/71

Acacia leg. Lint Bal A.

#1	+ 11	3	1L OD	8	60L 9D	(longitudinal)
	+ 12	2	5 }	7	4L OD	
	++ 13	1	0 }	3	3L 2D	
	+ 14	2+locus	1	4	23L 39D (10S)	
#2	+ 21	4	4	6	4L 47D (16S)	
	N 22	1	0	0	4L OD	2mgt
	++ 23	2	0	0	11L 12DS	
	++ 24	7	1	4	0 11DS	
#3	++ 31	1	0	0	14LS OD	1 knoth
	+ 32	3	3	0	91L 50P	
	+ 33	1	3	1	0L 36DS	
	+ 34	4+HS	0	0	6L 31DS	1mgt
	Σ	31+23	18	4D	220L 192D (14S) (116S)	
	X/dm ²	2.6	1.5	0.3D	2.4	18.3L 16.8D (1.2S) (9.7S)

ALL den² samples

8/10 - 8/12/71

(1)

#1	den ²	Acorn	leg	Leaf	Bd	A. de	Other
	+1	0	2	0	8L 13DS	0	
	+2	1	0	1	1L 73D(38S)		
	+3	2	1	0	0 10D(38S)		
	++4	1	2	0	0 0		
	N 5	0	3		0 4D		
	+6	1	1		15 9DS	0	
	N 7	0	3		0 0	1	
	+8	0	1		0 0	1	
	+9	2	2		0 0	0	
	0 10	5	0		0 45 m. leaflets!	1	
	0 11	0	3		0 13	4	
	0 12	2	4	0	0 6	1	
#2	++21	3	0	0	6L 42D(34S)	0	
	+22	2	2	no	0 0		
	++23	2	0	cont?	3LS 12D(7S)		
	+24	1	2		0 0		
	+25	0	3		0 0		
	+26	1	1		0 0		
	N 27	3	0		0 2DS		
	++28	5	1		0 22DS		
	N 29	5	0		0 0		
	++30	6	0	0	10LS 4DS	0	
	+31	4	1	1	1L 0	0	
	++32	2	0	0	17L(2S) 43DS	0	
	+33	2	0	0	0 47D(36S)	0	
	+34	2	2	2	0 39D(5S)	0	
	+35	2	3	3	1L 18D(2S)	0	
	+36	0	1	1	0 1D	0	
	N 37	5	4	4	1L 8D	1	
	N 38	0	0	0	0 0	0	
	N 39	0	5	5	0 0	0	
	N 40	1	0	0	0 0	0	

{ 1 thin
2 m
1 A

AS-12 ^X

Take #1 p2.

right

mm mm mm Bern

pod pod
stake
H. 2.

Year Date Tide/Time Water temp. Other

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

			Organism Count Size= Avg. mm. (S=shells with oil)																	
Species=			Live			Dead			Live			Dead			Live			Dead		
Plot #	Oil?	Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size			

DATA SUMMARY for Study Site DOX BURY REEF Transect AG-13 Oil? no n = 2 m² p. 1

L= live
D= dead; += scars
S= oil on shells
T= on top of oil
N= no oil on shells

		Organisms					
Year	Date		per m ²	per m ²	per m ²	per	per
(1971)	7/23	\bar{X}/unit	12.0/m ² ~ 1.5D	10L, 12D	1 <i>Planorbis</i> 1 <i>Paratithys producta</i> 1 <i>Thais</i>	4 <i>Mytilus</i> SHELLS	
		Σ	24L, 30shell		2 <i>tuberculosa</i> 1 <i>Littorina saxatilis</i> 2 <i>Pholidota</i>	1 <i>Mytilus</i> SHELL	
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					

7/23/71

Amara
egg

Bal

Other

N 1 24L, 30 shells 10L, 12D

1 Litter Pent

DIEAD
40mg shell
Myrmica
1 Chlor shell

1 Pagnrus

N 2

0

0

1 Thais
2 tubeworms
1 Peripat
2 Phaladidea penita

[illegible]

AT-14^x
p²

see map

Investigator _____

[illegible]

Year Date Tide/Time Water temp. Other

[illegible]

TRANSECT WORKSHEET - G. Chan
January, 1971

AT-14

P1

Study Site DUXBURY REEF

Area A Section _____ Channel _____

Transect _____ Type _____

Other AZ4, M² EVERY 50 METERS
AZ2, M² EVERY 25 METERS

Reference _____

Investigator CARL ZEIGLER

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date JULY 20 Tide/Time -1.1/4:42 AM Water temp. _____ Other _____

Plot #	Oil?	Species=	Organism Count			Size=Avg. mm.			(S=shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
		<u>S. purpuratus</u>									
AZ4-1	NO	90%	0A	0D							
2	NO	95%	8L	0D							
3	NO	95%	0L	0D							
TOTAL PLOTS = 3		<u>280 ÷ 3</u>	<u>8L</u>	<u>0D</u>							
		<u>$\bar{x} = 93\%$</u>	<u>$\bar{x} = 2.7L$</u>	<u>0D</u>							

Year 1971 Date JULY 21 Tide/Time -1.2/5:24 AM Water temp. 15°C Other _____

Plot #	Oil?	Species=	Organism Count			Size= Avg. mm.			(S=shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
		<u>BORING CLAMS</u>									
AZ2-1	+	90%	17L	6D							
2	NO	85%	12L	5D							
3	NO	60%	3L	5D							
4	NO	75%	25L	12D							
5	+	55%	2L	0D							
TOTAL PLOTS = 5		<u>365 ÷ 5</u>	<u>59L</u>	<u>28D</u>							
		<u>$\bar{x} = 73\%$</u>	<u>$\bar{x} = 11.8L$</u>	<u>5.6D</u>							

THE SIZE OF THE BORING CLAMS REMAINED SHROUDED BY THE PROTECTIVE SHALE.

OBSERVATIONS: THE DETAILED OBSERVATIONS ARE CONTAINED IN THE ATTACHED TRANSECT WORK SHEETS, A SUMMARY OF WHICH FOLLOWS

AREA A

● 1. SEA URCHIN TRANSECT AZ₄, 3 PLOTS:

- a. Strongylocentrotus purpuratus LIVE $\bar{X} = 2.7/m^2$
DEAD $\bar{X} = 0/m^2$
- b. ALGAE $\bar{X} = 93\%/m^2$
- c. OIL $=$ NONE OBSERVABLE

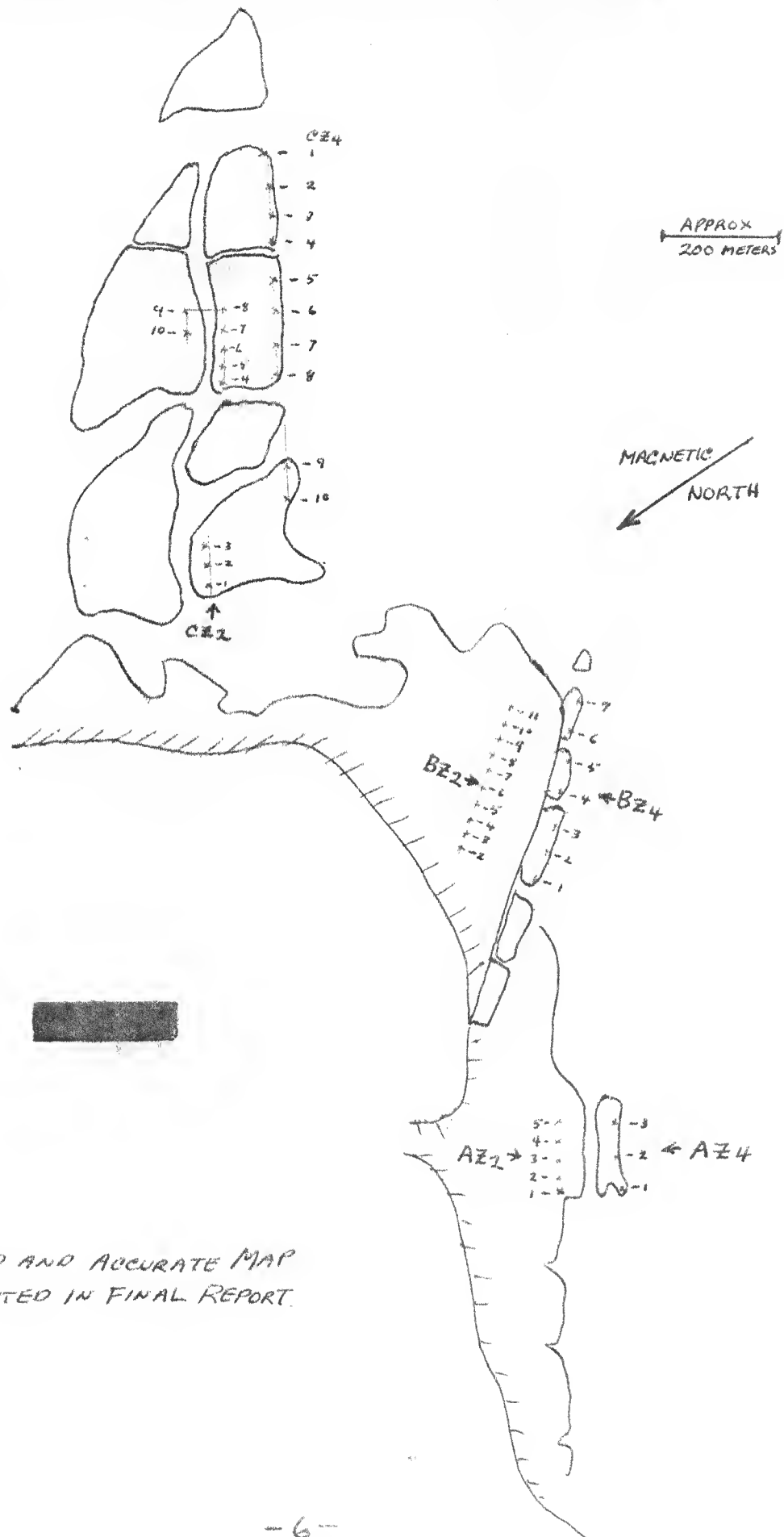
● 2. BORING CLAM TRANSECT AZ₂, 5 PLOTS:

- LIVE CLAMS $\bar{X} = 11.8/m^2$
DEAD CLAMS $\bar{X} = 5.6/m^2$
ALGAE $\bar{X} = 73\%/m^2$
OIL = PLOTS #1 AND #5, LESS THAN 25%
= PLOTS #2, 3 AND 4, NO OIL

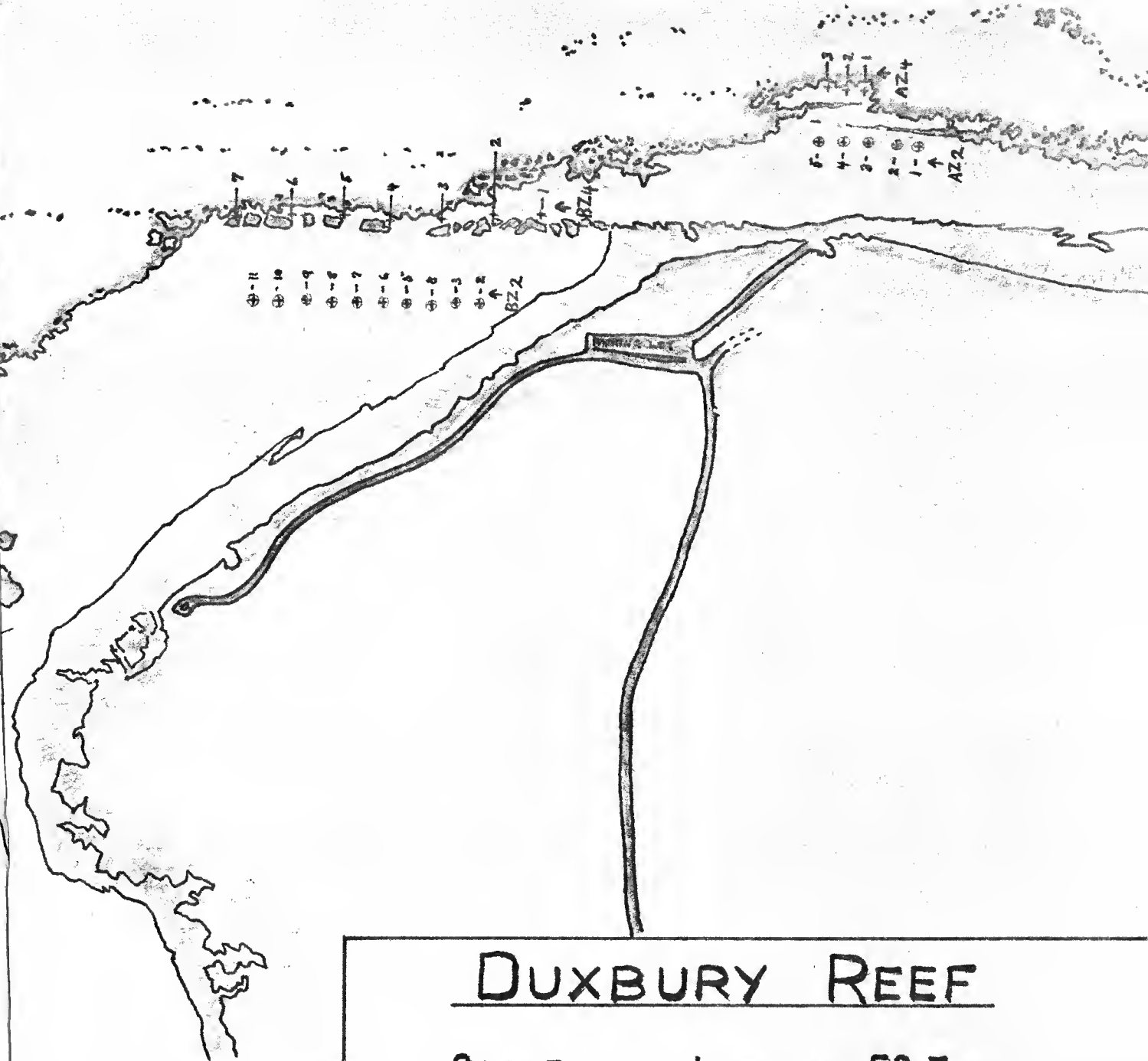
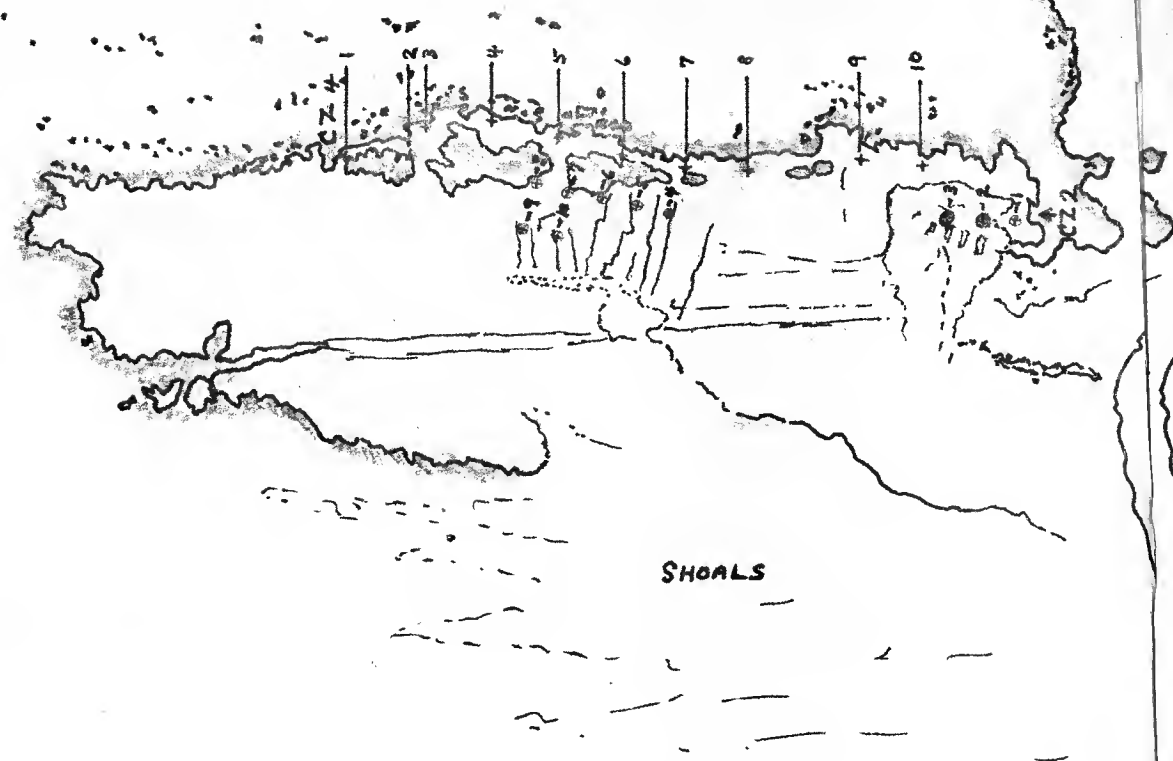
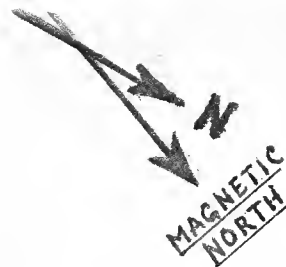
- MEAN OF PERCENTAGE OF ALGAE FOR THE 8 PLOTS ON AREA A: $\bar{X} = 81\%/m^2$

APPROXIMATE LOCATIONS OF PLOTS ON DUXBURY REEF *

Ziegler
AT-14
BT-12
CT-15



* A MORE DETAILED AND ACCURATE MAP
WILL BE PRESENTED IN FINAL REPORT.



DUXBURY REEF

SCALE: 1 cm = 58.3 m

LEGEND

- | | |
|-------------|------------|
| ● — PLATEAU | ● — OCEAN |
| ● — BLUFF | ● — RIDGES |
| ● — REEF | + |
- TRANSECT PLOTS
+ = URCHINS ● = BORING CLAMS



Abalone -
Subtidal - Agate Beach Transect.
Marked by yellow rope

Area A
Reef

Agate Beach Drift Wood Hole

DATA SUMMARY for Study Site DUXBURY Transect AX-6 ^{AT-6} Oil? Oil? n= 9m² p. 1

L= live
D= dead; += scars
S= oil on shells
T= on top of oil
N= no oil on shells

		Organisms	<i>Regula</i> <i>gambusia</i>	<i>Callinectes</i> <i>virginicus</i>	<i>Mytilus</i> <i>edulis</i>	<i>Acornuthus</i> <i>spicata</i>		
Year	Date		per m ²	per m ²	per m ²	per m ²	per	per
1969	5/17	\bar{X}/unit	63.9	6.9	0.2			
		Σ	575	62	2			
		size	7/9	4/9	1/9			
		change						
1969	5/30	\bar{X}/unit	76.6	8.0	0.1	0.1		
		Σ	689	72	1	1		
		size	9/9	5/9	1/9	1/9		
		change						
1969	4/27	\bar{X}/unit	66.6	6.9				
		Σ	599	62				
		size	9/9	4/9				
		change						
		\bar{X}/unit						
		size						
		change						
		\bar{X}/unit						
		size						
		change						
		\bar{X}/unit						
		size						
		change						
		\bar{X}/unit						
		size						
		change						
		\bar{X}/unit						
		size						
		change						

$A-6+7z$

FACING SHORE

grass O. ^{orig} _g

water

已收

13/12/2014

1	8	7
2	9	6
3	4	5

Charles F. D. notes

[illegible]

DX-6A

A-72

TRANSECT WORKSHEET - G. Chan

Location - Site Title DUXBURY

FACING SHORE

Area A Section Transect 6Other Zone 7 Zoanaps

Reference

Chan o Pl to notes

Year	Date	Tide	Other conditions	Plot, Strip	Description
1969	5/17	8:00 AM	tie the two square meter plots #1 over water #2 water + large rocks #3 stream #4 right water	#1 #2 #3 #4 #5 #6 #7 #8 #9 Total X/m ²	67 kg 65 kg, 1 sea anemone 46 kg 64 kg, 5 sea anemones, 2 chitons 72 kg, 23 " " 62 kg, 33 " " 80 kg 55 kg 62 kg 575 kg, 62 sea anemones, 2 chitons 63.9 kg 6.4 0.2
1969	5/30	5:45 AM	#1 over water #2 water + large rocks	#1 #2 #3 #4 #5 #6 #7 #8 #9 Total X/m ²	125 kg, - , 1 sea anemone 110 kg, 2 AX 20 kg 67 kg 50 kg 8 AX 80 kg 37 AX 96 kg 17 AX 1 mag 106 kg 8 AX 33 kg 689 kg 72 AX 1 mag, 1 sea anemone 76.6 kg 8.0 0.1 0.1



Transect Worksheet

A-72

Year	Date	Tide	Other conditions	Plot, Strip	Description
1969	6/27		exact plot see 5/17	#1	102 top
				#2	71 top, 1 dead anem.
				#3	21 top
				#4	77 top, 5 rock anem.
				#5	77 top, 23 rock anem.
				#6	87 top, 23 rock anem.
				#7	58 top
				#8	59 top
				#9	47 top
			Total X/m ²	661	599 top 62 rock anem. 66.6 : 6.9

A-IX left
at right
RAU Don

Всех

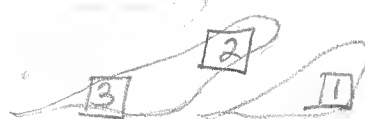
Other Line 1, left of x (or 1st iden
right of x) search line →
or right of x (again)

Chan's Ph. D notes
1st island to left of X

[illegible]

X
A-1, 2nd x
left

Left $g \times (map)$



Arab R. Dots

2nd island left 8th

island X

second pool

Year	Date	Tide	Other conditions	Plot, Strip	Description
1969	5/17	7:00 AM	2nd island left 3x random square meter plots	#1 #2 #3	rt. edge 7 sea urchins pool on island 53 sea urchins left tip of island 1 sea urchin
					61 or 20.3/m ²

Am

Random

Other

Line 3

#1 - vertical case to

vertical line on map

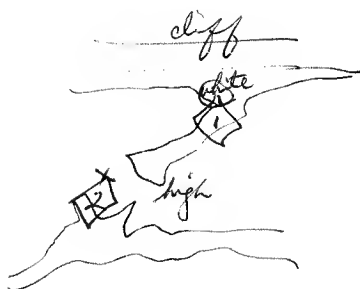
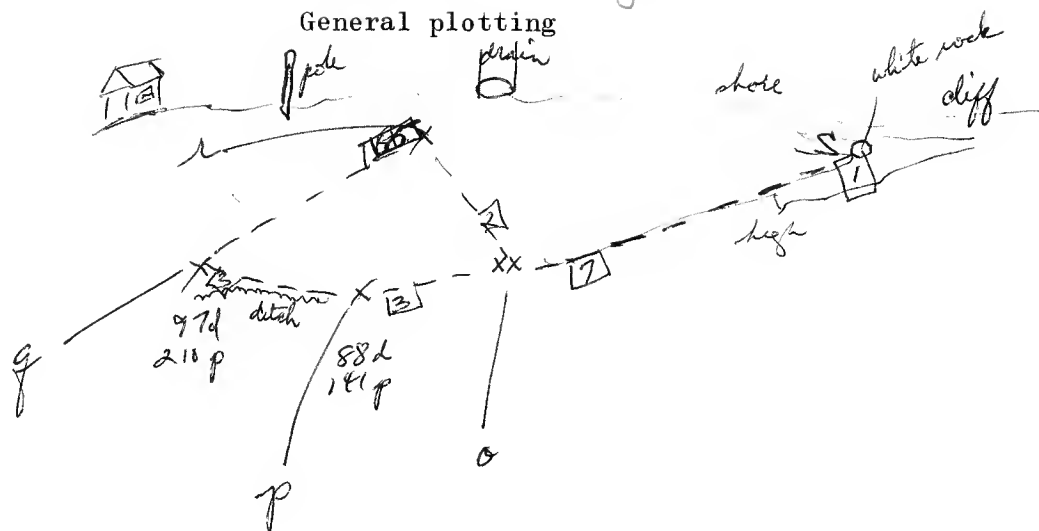
#2 - April 1984 end

Charles F. D. writes

[illegible]

BASE COUNT 1- page 2
May 30, Friday
5:45 A.M.

RANDOM PLOTS, every 10 m or so



S (1)

33 teg, 6 sea anem

(2)

61 teg

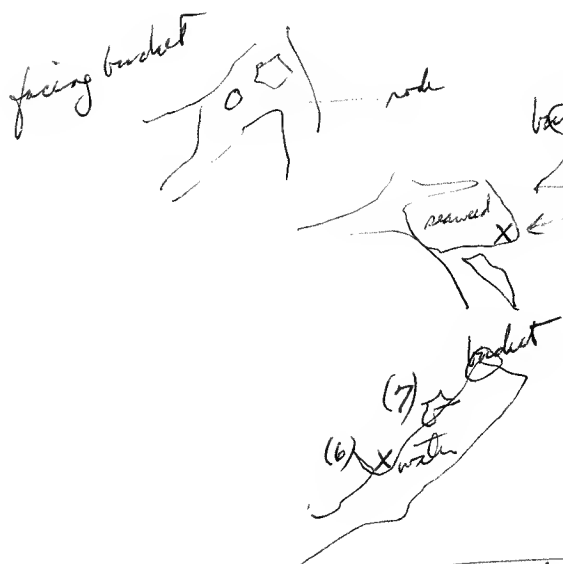
(3) on black patch 5 adult, 28 juvenile teg near water, about 5 ft to rt of stream

(4) in large pool, 23 teg, 18 sea anem on corner of big rock (no nail)

(5) gigartina and fucus 17 teg, many periwinkles

(6) covered w gigartina, some fucus 2 teg

(7) more barren, 56 teg one small island rock



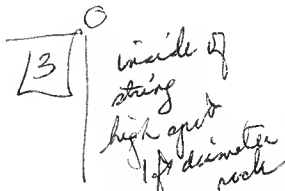
place yellow bucket = 165 m, 88 yds from drain

BASE COUNT 1- page 3
May 30, Friday
5:45 A.M.

10m from ^{area} (plot 2)



- (1) *red rock* 82 teg
- (2) 62 teg, 1 chi
- (3) 50 teg



yellow bucket = 88 yds drain
141 from 1st pole to left

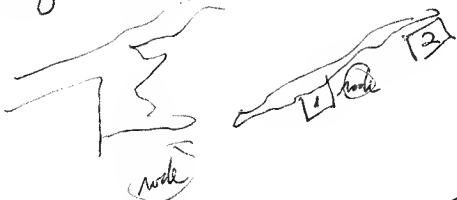
Along low shallow ditch,

- p (1) 70 teg

lined up toward house on hill

facing ocean

- (2) edge of transect in water 30 teg, 2 chi, 1 anemone
- (3) ditch bends to left, lay line in usual direction 27 teg, 1 chi, 1 anemones

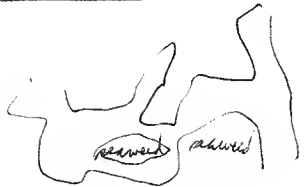


facing shore 97 yds on drain, 210 yds to post

just in front of 3 large rocks

g

- (1) large holy rock 45 teg, 1 chi to rt of water, just before stream, horizontal to shore
- (2) large rock in stream which angles toward left of shore *transect over water* 90 teg, 10 sea anem
- (3) large rock next to flat holy rock twice as large 60 teg, 1 cancer crab, 1 chi
- 5-arm pool transect completely in water, large pool
- (4) near barren flat area 1 teg, sparse gigartina, pelvetia



- (5) 43 yds from drain perwinkle, a few pelvetia obsis

r

transect on whitish rock, high mound (standing at drain, 45° rt)



BASE COUNT 1- page 4
 May 30, Friday
 5:45 A.M.

Continuing from plot (5) on whitish rock-

Lined up between whitish rock
 and bucket on double nails of
 area Z square plot area

(1) speckled rock 1 teg

(2) line goes over 1 acmaea pelta, fucus, gigart.
 water, perpend
 to drainpipe

192
 173
 243
 140
 33

 781

243
 62
 44
 53
 51

 453

666

 54
 144
 117
 200
 151

33
 28
 78
 48
 75

 262

101
 154
 96
 238
 589

 589

89
 85
 103
 87
 270

 634

D
X

Area
B

over

Other

21 ✓

Investigator _____

Year	Date	Tide/Time	Water temp.	Other
------	------	-----------	-------------	-------

[illegible][illegible]

[illegible]

[illegible]

2-4
BT-4

Всего

Transect BT-4 Type 16 m²

Other _____

Reference

Investigator _____

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year Date Tide/Time Water temp. Other

[illegible]

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

BT-6

81-6
P1
do not
use

tree
sign
telephone pole

top of diff before

3 2 1
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
25 26 27
28 29 30
31 32 33
34 35 36
37 38 39
40 41 42
43 44 45
46 47 48
49 50 51
52 53 54
55 56 57
58 59 60
61 62 63
64 65 66
67 68 69
70 71 72
73 74 75
76 77 78
79 80 81
82 83 84
85 86 87
88 89 90
91 92 93
94 95 96
97 98 99
100

Other opp sign & telephone pole on
shore line placed along eel grass

Investigator _____

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date Tide/Time Water temp. Other

[illegible]

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

TRANSECT WORKSHEET - G. Chan

B-6

Location - Site Title DUXBURY

Area B Section _____ Transect 6

Other open sign & telephone pole

on shore level grass

along creek & road

tree

sign

telephone pole

tree trunk

shore

water

Reference

Chan's Ph.D. notes

3	2	1
4	9	8
5	6	7

Year	Date	Tide	Other conditions	Plot, Strip	Description
1969	5/17		lie too close to shore Plot #1 ed grass creek	#1 #2 #3 #4 #5 #6 #7 #8 #9 Total 7/m	<u>Antioch day</u> 84 kg, 4 sea anem, 1 acanthina 55 kg, 12 sea anem, 1 acan 58 kg, 4 acan 48 kg, 3 sea anem, 3 acan 60 kg, 41 sea anem, 7 acan 52 kg, 2 acan 41 kg 79 kg, 6 sea anem 43 kg, 18 sea anem, 3 acan 517 kg 116 kg 43 acan 116 43 676

TRANSECT WORKSHEET - G. Chan

Location - Site Title DUXBURY

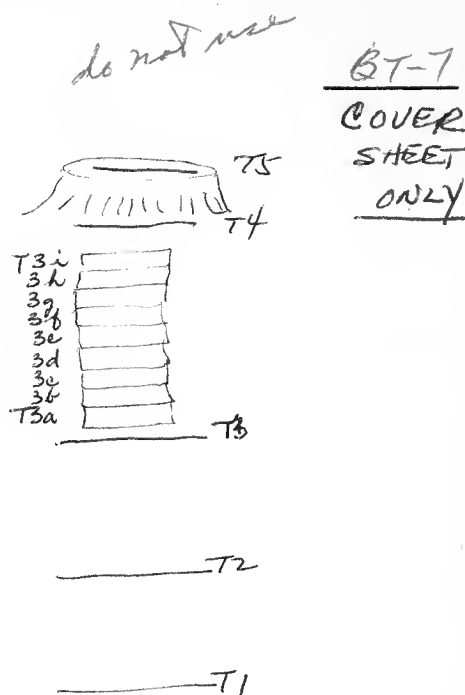
Area B Section _____ Transect Between
B3 and B4

Other nine transects
(T3a through T3i) of
10 m² each

n = 90 m²

Reference

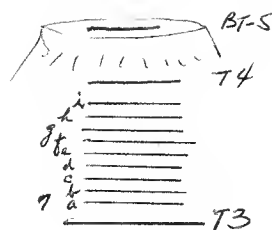
Biol 20A students



Year	Date	Tide	Other conditions	Plot, Strip	Description			
1970	3/10	0.1 @ 7:24 AM		TRANSECT	<i>Pagurus funebralis</i> \bar{X} leg/m ²	\bar{X} age of juv + leg	\bar{X} for <i>Megapala</i> Living, Empty Holes	
				T3a	59.4/m ²	3.5 yrs	1.0, 24.0	
				T3b	39.8	2.7	0.2, 12.0	
				T3c	37.9	4.0	0.2, 5.0	
				T3d	39.8	2.4	0.2, 5.0	
				T3e	37.2	4.5	1.0, 2.5	
				T3f	38.6	3.0	0.9, 2.5	
				T3g	58.0	5.0	2.0, 9.0	
				T3h	28.0	4.9	0.7, 3.0	
				T3i	38.8	3.1	0.2, 4.7	
				$\Sigma \bar{X}_i$	377.5	33.1	6.4	67.7
				mean of the means	41.9	3.7	0.7	7.5

BT-7a
12510 P1

Other _____



Investigator _____

_____ T2

Organism	Count	Size=Avg. mm.	(S=shells with oil)
1	2		
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
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92			
93			
94			
95			
96			
97			
98			
99			
100			

[illegible]

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

BT-76 X
2nd 10^{pr}

(see BT-7a)

Investigator _____

Year 1971 Date 11/11/71 Tide/Time 11:00 Water temp. 50 Other 1000

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

BT-7c
3416

Investigator _____

Year 1971 Date _____ Tide/Time _____ Water temp. _____ Other _____

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

BT-7d

4^{p1}10

Area *B* Section _____ Channel _____

Other _____

Investigator _____

Year 1971 Date _____ Tide/Time _____ Water temp. _____ Other _____

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

BT-7c X
5th P'

Plot #	Species=													
	Oil?	Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size

BT-78
6th P. 10

Other 8 10 1/2 each

Investigator _____

Year 1971 Date _____ Tide/Time _____ Water temp. _____ Other _____

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

BT-7g
p1
7th 10

Other of 10m² each

Reference

Investigator _____

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year <u>1971</u> Date	Tide/Time	Water temp.	Other
-----------------------	-----------	-------------	-------

	Organism Count	Size=Avg. mm.	(S=shells with oil)
BT-7g 7 th 10m ²			

[illegible]

Year Date Tide/Time Water temp. Other

Organism Count	Size= Avg. mm.	(S=shells with oil)
1	1.5	
2	2.0	
3	2.5	
4	3.0	
5	3.5	
6	4.0	
7	4.5	
8	5.0	
9	5.5	
10	6.0	
11	6.5	
12	7.0	
13	7.5	
14	8.0	
15	8.5	
16	9.0	
17	9.5	
18	10.0	
19	10.5	
20	11.0	
21	11.5	
22	12.0	
23	12.5	
24	13.0	
25	13.5	
26	14.0	
27	14.5	
28	15.0	
29	15.5	
30	16.0	
31	16.5	
32	17.0	
33	17.5	
34	18.0	
35	18.5	
36	19.0	
37	19.5	
38	20.0	
39	20.5	
40	21.0	
41	21.5	
42	22.0	
43	22.5	
44	23.0	
45	23.5	
46	24.0	
47	24.5	
48	25.0	
49	25.5	
50	26.0	
51	26.5	
52	27.0	
53	27.5	
54	28.0	
55	28.5	
56	29.0	
57	29.5	
58	30.0	
59	30.5	
60	31.0	
61	31.5	
62	32.0	
63	32.5	
64	33.0	
65	33.5	
66	34.0	
67	34.5	
68	35.0	
69	35.5	
70	36.0	
71	36.5	
72	37.0	
73	37.5	
74	38.0	
75	38.5	
76	39.0	
77	39.5	
78	40.0	
79	40.5	
80	41.0	
81	41.5	
82	42.0	
83	42.5	
84	43.0	
85	43.5	
86	44.0	
87	44.5	
88	45.0	
89	45.5	
90	46.0	
91	46.5	
92	47.0	
93	47.5	
94	48.0	
95	48.5	
96	49.0	
97	49.5	
98	50.0	
99	50.5	
100	51.0	
101	51.5	
102	52.0	
103	52.5	
104	53.0	
105	53.5	
106	54.0	
107	54.5	
108	55.0	
109	55.5	
110	56.0	
111	56.5	
112	57.0	
113	57.5	
114	58.0	
115	58.5	
116	59.0	
117	59.5	
118	60.0	
119	60.5	
120	61.0	
121	61.5	
122	62.0	
123	62.5	
124	63.0	
125	63.5	
126	64.0	
127	64.5	
128	65.0	
129	65.5	
130	66.0	
131	66.5	
132	67.0	
133	67.5	
134	68.0	
135		

[illegible]

BT-2ch
8 \pm 10 p'

Investigator _____

Year 1971 Date _____ Tide/Time _____ Water temp. _____ Other _____

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

BT-72^x
9th 10¹

Investigator _____

Year 1971 Date	Tide/Time	Water temp.	Other
10/10/71	10:00	18.5	
10/11/71	10:00	18.5	
10/12/71	10:00	18.5	
10/13/71	10:00	18.5	
10/14/71	10:00	18.5	
10/15/71	10:00	18.5	
10/16/71	10:00	18.5	
10/17/71	10:00	18.5	
10/18/71	10:00	18.5	
10/19/71	10:00	18.5	
10/20/71	10:00	18.5	
10/21/71	10:00	18.5	
10/22/71	10:00	18.5	
10/23/71	10:00	18.5	
10/24/71	10:00	18.5	
10/25/71	10:00	18.5	
10/26/71	10:00	18.5	
10/27/71	10:00	18.5	
10/28/71	10:00	18.5	
10/29/71	10:00	18.5	
10/30/71	10:00	18.5	
10/31/71	10:00	18.5	

[illegible]

Year	Date	Tide/Time	Water temp.	Other
------	------	-----------	-------------	-------

		Organism Count. Size= Avg. mm. (S=shells with oil)												
Plot #	Species=		Live			Dead			Live			Dead		
	Oil?	Algae, other	Count	Size	Count	Size	Count	Size	Count	Size	Count	Size		

x

BB-8

new berm transect

did not count
for 1971

Transect BR-9

Transect BR-9 is located in area B on the northwestern edge of the ridge. It is made up of 2 large tidepools, one of which had easily distinguishable boundaries, while the second pool, pool #2, did not. Because of this it was necessary to place 2 m² frames over the area, dividing it into decimeters, and thus obtaining our counts, in pool #2.

My objective of this transect was to count only *Thamnius* spp., a small tidepool crab of the littorines in the two pools. In the first pool, I obtained the count by counting each individual organism in the pool; while in the second pool this was almost impossible, because of the extensive area over which the pool covered. Because of this the 2 m² frames were used, divided into decimeters (as shown on page 1), and the organisms were counted.

Although various areas around the pools were covered with oil, none appeared to be in the pools. There was no direct evidence that the oil did any damage at all in this particular area.

The *Thamnius* were all found in the first large pool, and only in one area, grazing on the green algae. The *Littorines* appeared in great numbers in both pools, with ^{2,490} ~~2,460~~ in the 2 m² area and 1,973 in the first large pool.

each pool total count of H. smithi
 10 dm²/m² sampling of Z. tentulata in each pool

BR 9 5
 26

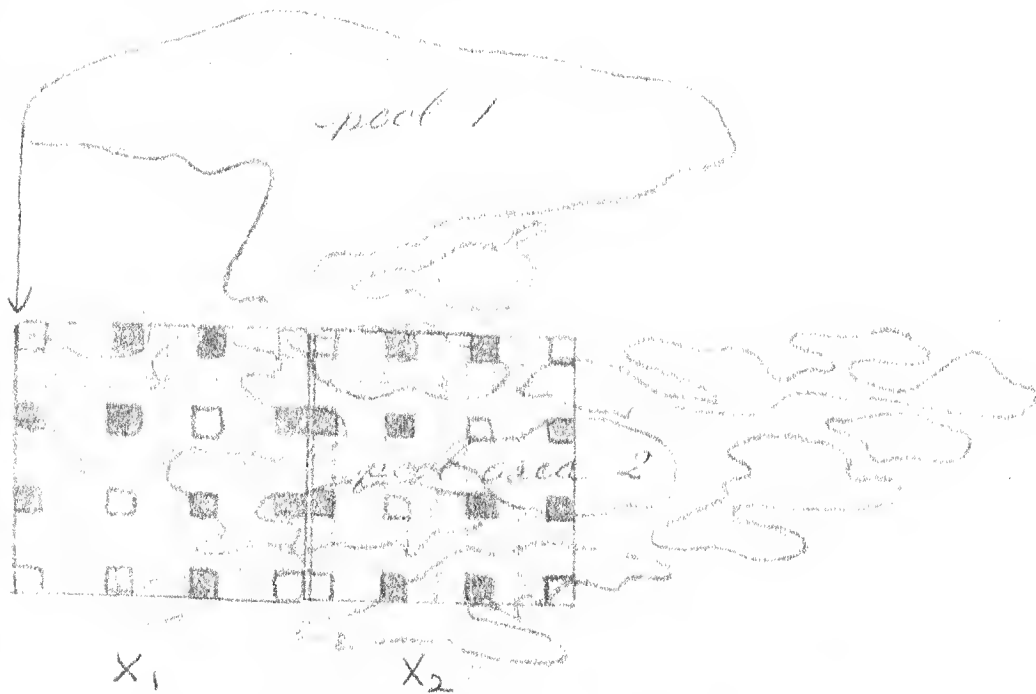
Observation

BR-9

Tidepool area

• marker

Ridge B



■ = decimeters counted

North

East

West

South

The tidepool area
 BR-9 is located on
 the northwestern edge
 of Ridge B. (BR-10)

summer,
 1971

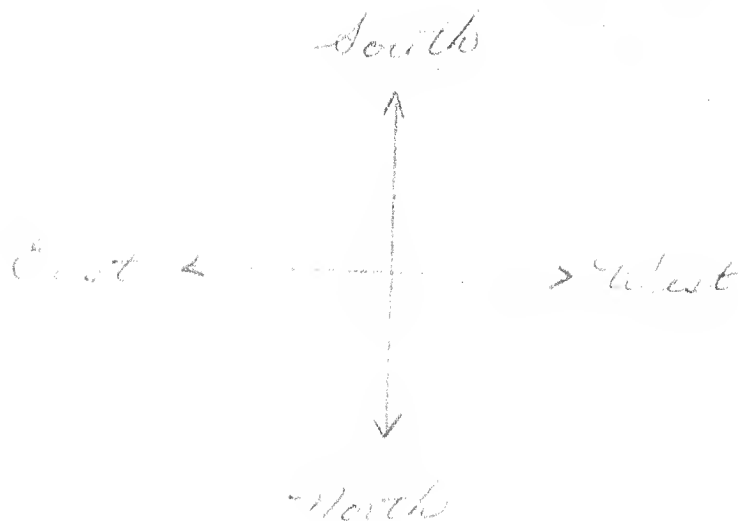
10 dm² in each m²

dm² plots #1, 4, 7, 10 in each row

Ridge total count of Lothia gigantea only BR10 2-7
(note presence of other species, but
DO NOT count others)
Observation 1)

BR = 10

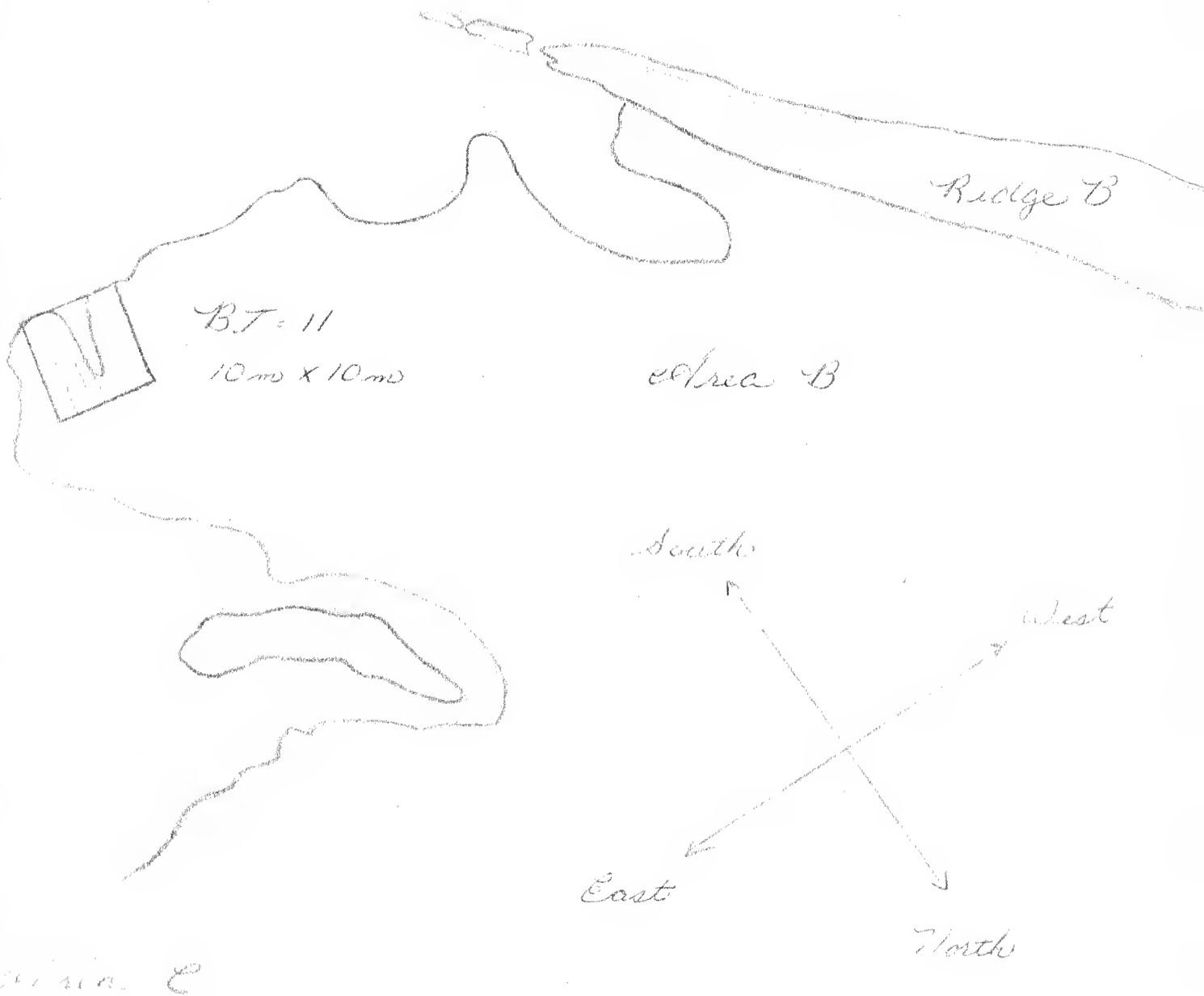
Ridge - area B
500m.
along top of
ridges.



BR = 9

sidepool area

Total count only of *Cryptochiton* BT-11 X7
stellus



Observations. BT-11

under 1-11 x 12

Transect Type _____

Zone 2, m² only 25 m m² cont of PLA only. 2-9

Investigator _____

live ~~deposition~~ fossils
organisms

[illegible][illegible]

D
X

Area
C

TRANSECT WORKSHEET - G. Chan
January, 1971

CT-1

Study Site DOXBURY REEF

Area C Section 2 Channel

Transect CT-1 Type 10m²

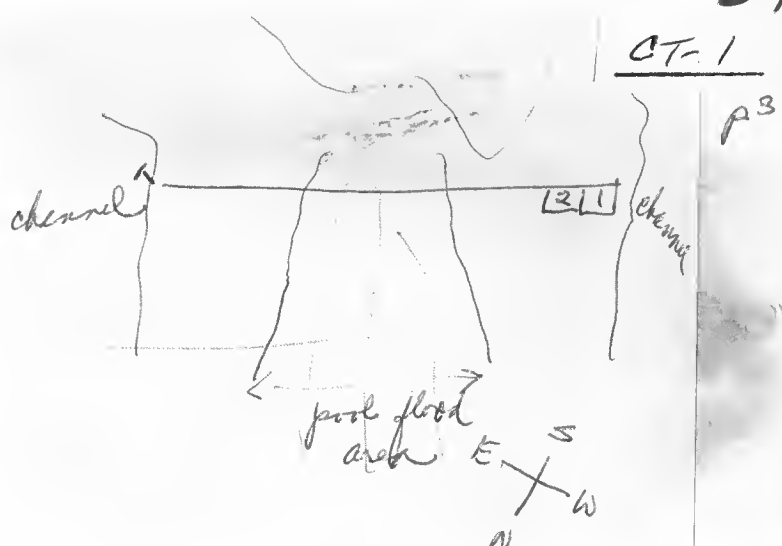
Other Island north of

Area C north of channel

(on crest ridge on island)

Reference Selbach's map

Investigator _____



For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

Year Date Tide/Time Water temp. Other

			Organism Count Size= Avg. mm. (S=shells with oil)																	
Species=			Live			Dead			Live			Dead			Live			Dead		
Plot #	Oil?	Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size			

Study Site DOXBURY REEF

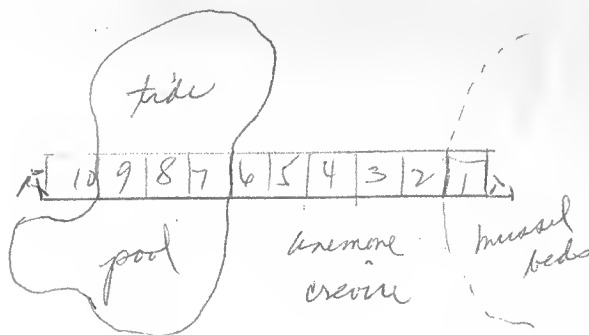
Area C Section Channel

Transect CT-2 Type 10m²

Other full m² counts for each species except for Balanus glandula ± 10 den² in each m²

Reference _____

Investigator _____



For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 72 Date 4/27 Tide/Time 0504:55 Water temp. 15°C Other Clear

Plot #	Oil?	Species=	Organism Count			Size=Avg. mm.			(S=shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1		Algae, other <i>Mytilus californicus</i> <i>Polligys</i> ?	18						1	50	150
2		<i>Cerastium</i>	16			10 Xan			15	11"	80
3		<i>Fucus</i> <i>Ulva</i>	30			10 Xan 6 Ele			8		20
4			1			0					12
5						3 Xan			6		3
6						5 Xan					15
7									3		1
8											0
9			1			2 Xan			28	≤ 5cm	0
10			2			1 Ele			10	Small	10

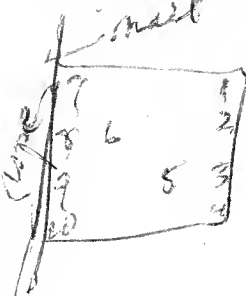
Year 72 Date 6/28 Tide/Time _____ Water temp. _____ Other _____

Plot #	Oil?	Species=	Organism Count			Size= Avg. mm.			(S=shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	0	<i>Balanus</i> 10 den ² /m ² winter counts in back of paper	6			0			ACM	ACAN	LITT
2			4			10			THINA	ORINA	
3			8			10			1	82	
4			10			8			2	51	
5			12			6			3	21	
6		<i>Ulva</i> covering m ² 3,4,5,9,10				5			1		
7						5					
8			4								
9			9			2			6		
10						2			4		

6/28/72

Balances over size = 2 mm dia

DM



m.	1	2	3	4	5	6	7	8	9	10
1	168L 20	28L 10	45L 10	17L 00	45L 10	52L 60	14L 20	4L 20	210L on mesh 70	170L 80
2	14L	96L 20	120L 30	130L 10	16L 20	48L 20	120L 100	3L	14L	80L 10
3	10L	90L 10	32L 20	115L 80	6L	26L 10	215L 30	48L 20	28L	6L
4	200L 80	ulva —————>								
5	ulva	—————>								
6	water									
7	water									
8	water									
9	ulva + water	—————>								
10	ulva	—————>								

100m
42L
80

TRANSECT WORKSHEET - G. Chan
January, 1971

Study Site Transect #3

Area Section Channel

Transect Type

Other This transect is on
the seaward side of the
reef bearing 310° NW

Reference Points towards two telephone
poles

Investigator Steve Harris



For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 4/29 Tide/Time -9 9:54 Water temp. 10°C Other Overcast, Cold foggy
Air 12°C

		Organism Count Size=Avg. mm. (S=shells with oil)											
		Species= <u>Mytilus Calif.</u>			<u>Polydora</u>			<u>Anemone</u>			<u>Snail</u>		
Plot #	Oil? Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1		700	0	9.5/35	307	0							
2	Yes	800	0	9/3	152	0		7	0				
3	Yes	500	0	6/2	203	0							
4		600	0	8/2	336	0					4	Small	
5		500	0	5.5/1.5	230	0		10			1	chiton.	
6		1200	0	4.5/1.5	345	0							
7		1500	0	5/2	220	0							
8		1500	0	4.5/2	180	0		4	0				
9	Heavy	1600	0	5.5/2	255	0							
10		400	0	8/2.5	73	0		10	0				
		All		Healthy	All		Healthy						

Year 1971 Date 5/11 Tide/Time -8 7:06 Water temp. 10°C Other Overcast, Cold foggy
13°C air

		Organism Count Size=Avg. mm. (S=shells with oil)											
		Species= <u>Mytilus Calif.</u>			<u>Polydora</u>			<u>Anemone</u>			<u>Snail</u>		
Plot #	Oil? Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1		800	0	7/3	100								
2	Yes	900	0	9/3	100								
3	Yes	500	0	7/3	100			10			1	Chiton.	
4		200	0	6.5/1.5	300			6					
5		1000	0	7/2.5	200			1					
6		1200	0	4.5/1.5	250								
7		1500	1	5/2	200								
8		1600	1	5.5/2	150			4					
9	Yes	1500	0	5.2/2	200								
10		400	0	8/2.5	3								

TRANSECT WORKSHEET - G. Chan
January, 1971

Map the oil in each m²
note crabs.

3-3
CT-4
p3

Study Site DUXBURY REEF
Area C Section 3 Channel _____
Transect CT-4 Type 10 separate m²
Other see diagram
10 dm² random sample counts in
each m² for MYTILUS; full m² counts
Reference for POLICIPES & crabs
Investigator _____

see map

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

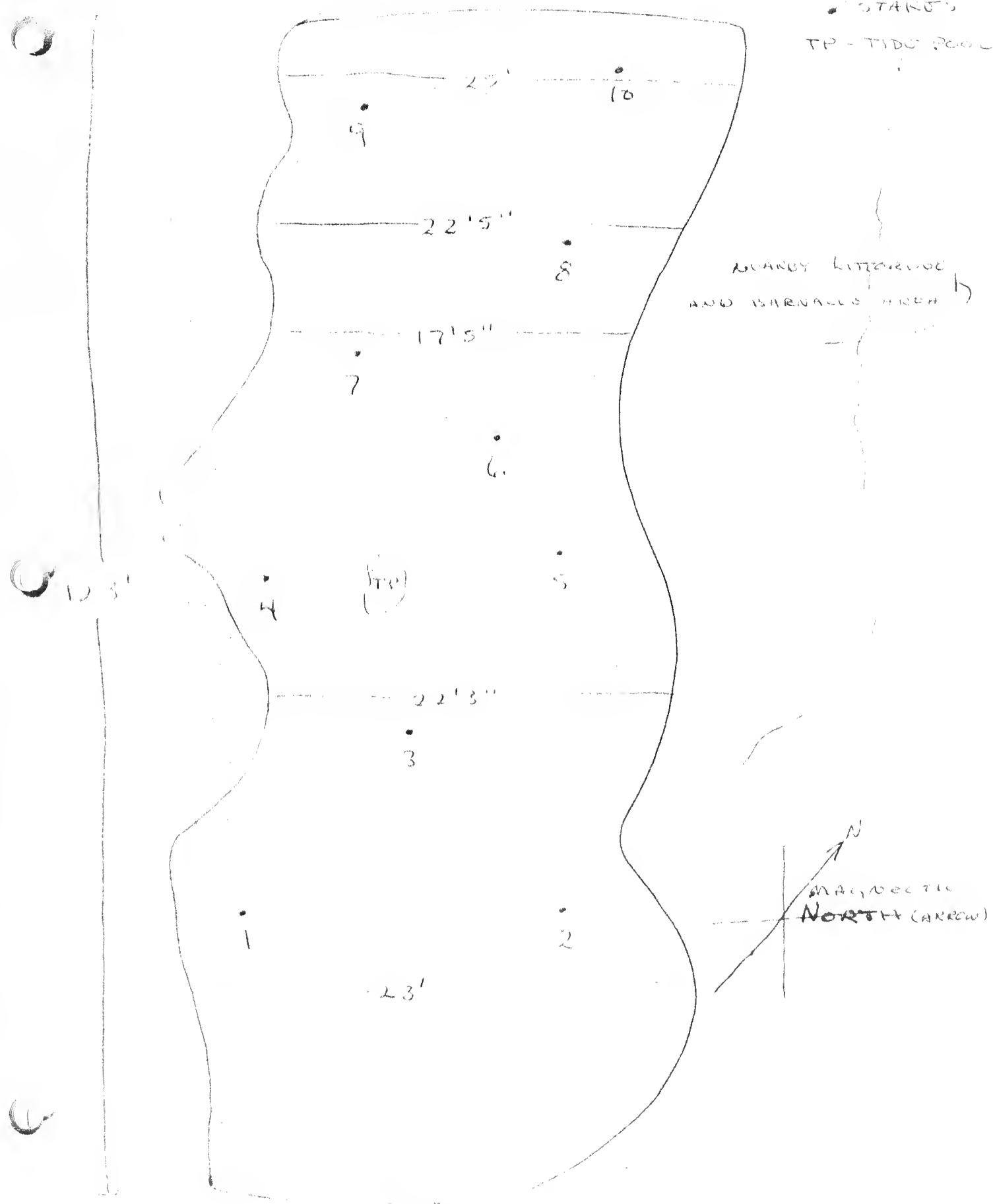
Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

		Organism Count			Size=Avg. mm.			(S=shells with oil)			LIST (no count) presence of other species			
Plot #	Oil?	Species=	Mytilus			Pollycipes			Crabs					
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
			per 10 dm ²	in each m ²		m ²	m ²							
			record dm ² counts on back of page											

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

			Organism Count Size= Avg. mm. (S=shells with oil)																	
Plot #	Species=		Live			Dead			Live			Dead			Live			Dead		
	Oil?	Algae, other	Size			Size			Size			Size			Size			Size		

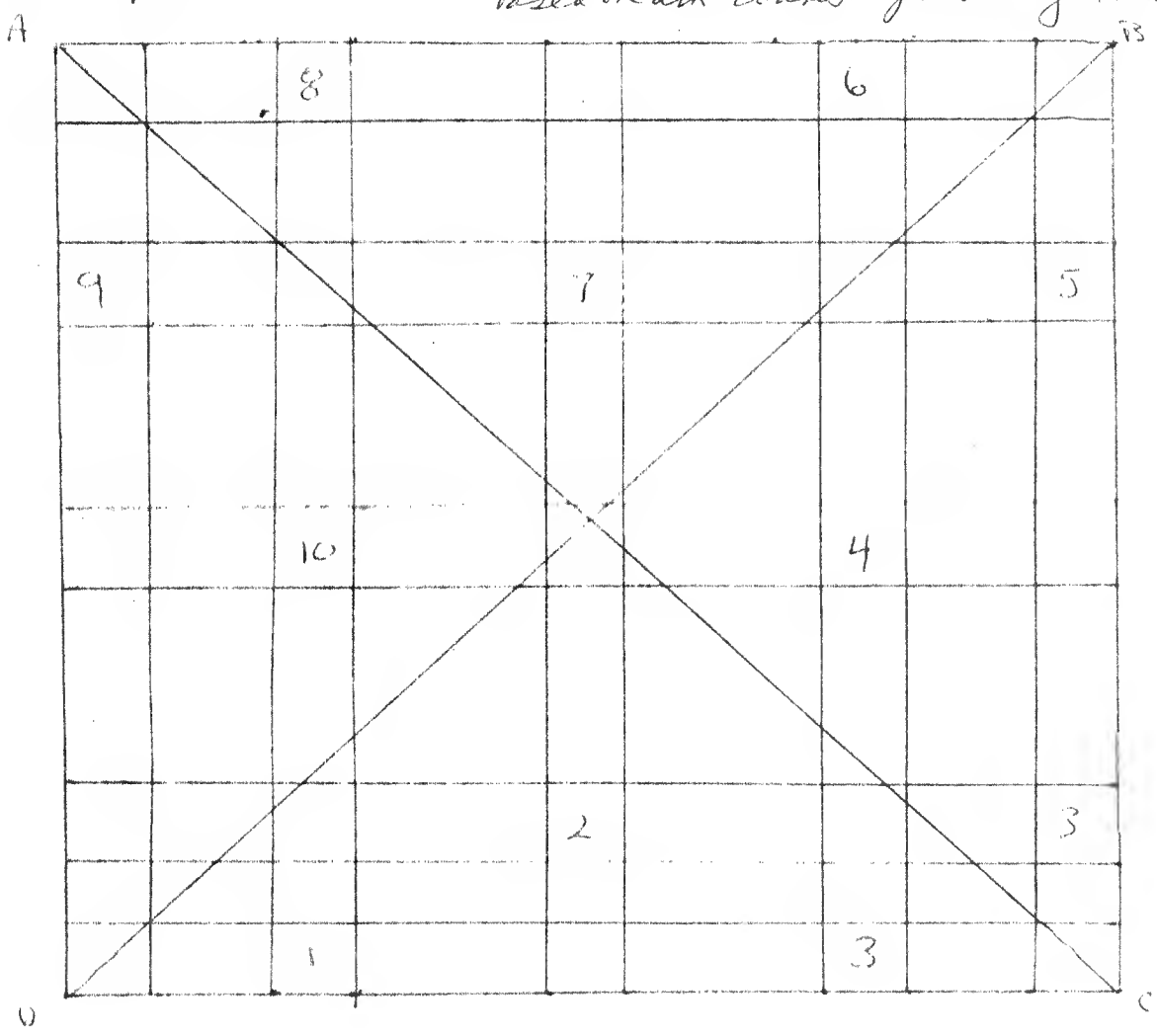
• STARKS
TP - TIDE POOL



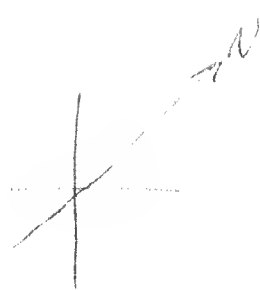
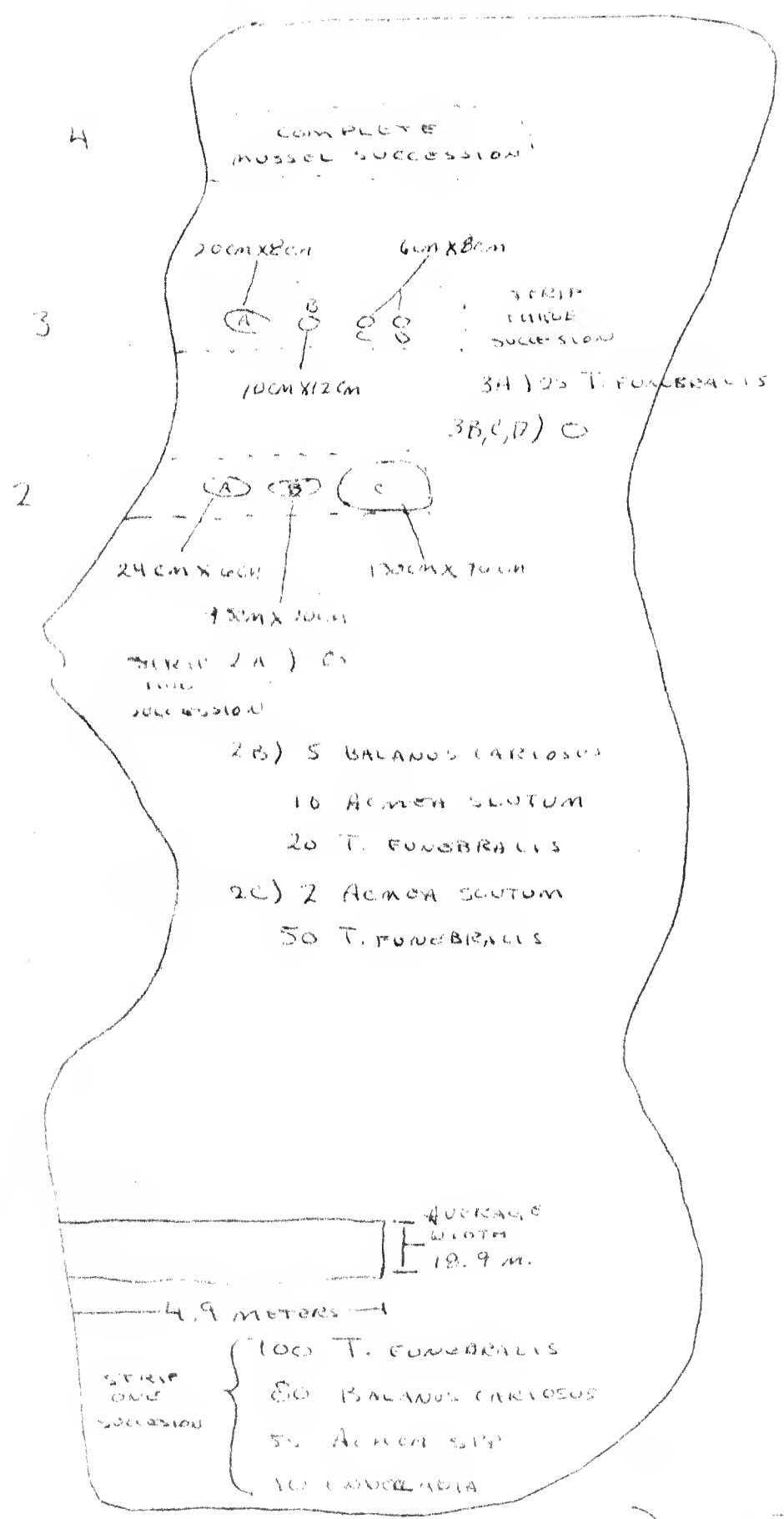
Take dm^2 samples for *Mytilus*, *Palanus*,
Regulus + *Thais* *Lamna* spp. + *Pollicipes* - just m count

Take dm^2 samples for *Littorina* if very dense population

Keep all dm^2 counts on record. DO NOT MAKE m^2 estimate
based on dm^2 counts - give average dm^2



date?



[illegible]

TRANSECT WORKSHEET - G. Chan
January, 1971

3-4
CT - 5
p2

Study Site Duxbury Reef

Area C Section L Channel

Transect CT 5 Type 10 m² seastar

Other corner and four alternate
m² mussel beds (10 dm² sample for
check on Mytilus)

Reference

Investigator M. I nacio & L. Stenzel

notes:

see previous data sheets for algae

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 8/8 Tide/Time 7:15 am Water temp. Other tide -0.7 @ 7:18

Plot #	Oil?	Species= Algae, other	Organism Count Size=Avg. mm. (S=shells with oil)								
			<u>PISASTER</u> <u>OCHRACEOUS</u>			<u>ACMAEA SPP.</u>			<u>LEPTASTERIAS</u> <u>SP.</u>		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
10	no	1 <u>CANCER ANTENNARIUS</u> 100 mm carapace	2	0	300	3	0	1-30	3	0	60
9	no	1 <u>C. ANTENNARIUS</u> 75 mm carapace	2	0	150-300	1	2		1	0	60
8	no	1 <u>PUGETTIA PRODUCTA</u> 50 mm carapace	3	0		1	3		1	0	
7	no		4	0		1	1		1	0	
6	no	1 <u>C. ANTENNARIUS</u>	4	0		6	2		0	0	

Year 1971 Date 8/9 Tide/Time -0.2 / 7:54 am Water temp. Other

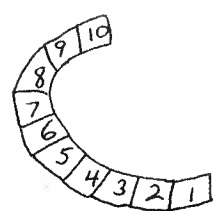
Plot #	Oil?	Species= Algae, other	Organism Count Size= Avg. mm. (S=shells with oil)								
			<u>Pisaster</u>			<u>ACMAEA</u>			<u>Leptasterias</u>		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
5	no	1 <u>P. producta</u> 1 <u>C. ANTENNARIUS</u>	1			5	8	2-15			
4	no	1 <u>C. ANTENNARIUS</u>	2			4	1	"			
3	no		4			7	1	"	1		
2	no		1			26	3	"			
1	no		0			66	6	"			
Σ			23L			120L 270			7L		

TRANSECT WORKSHEET - G. Chan
January, 1971

3.4
CT-5
p2

Study Site Duxbury Reef
Area C Section 4 Channel
Transect CT-5 type 10 m² seastar
Other Corner AND 4 Alternate
M² in mussel beds (10 dm² samples
in each mussel m² as a check)

Sea
Star
Corner



0 = A fan
rest = A ale

Reference _____
Investigator M. INACIO & L. STENZEL

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 7/22 Tide/Time -1.0/6:36 Water temp. _____ Other _____

Plot #	Oil?	Algae, other	Organism Count			Size-Avg. mm.			(S=shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
		Species=									
1		<u>Leptasterias spp.</u>	3	0	15-25	669	0	107	54	0	
2		<u>" 6cm.</u>	3	0	10-25	1522	0	1012	13	0	
3		<u>" 7cm.</u>	4	0	15-25	57	0	1026	11	0	
4		<u>"</u>	2	0	20-25	45	0	1010	29	0	
5		<u>" 7cm.</u>	1	0	20	19	0	107	4	0	
6		<u>"</u>	7	0	15-20	8	0	107	0		
7		<u>" 5cm.</u>	1	0	20	115	0	107	0		
8		<u>" 6cm.</u>	9	0	20-25	44	0	1010	0		
9		<u>" (4-10cm)</u>	1	0	20-25	29	0	1013	0		
10		<u>"</u>	1	0	25	27	0	106	0		
		<u>Σ</u>	32	0		2529	0	105	111		

Year 1971 Date 7/24 Tide/Time -0.5/7:42 Water temp. _____ Other _____

Plot #	Oil?	Algae, other	Organism Count			Size-Avg. mm.			(S=shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
		Species=									
1	NO	<u>Regula funebris</u> <u>Littorina scutulata</u> <u>ACMAEA, Thais</u>	635	10	All 5-10cm X=7	40	0		66	5	
3	NO	<u>T. funebris</u> <u>ACMAEA</u>	478	6	X=4.9	25	0		19	1	
5	NO	<u>T. funebris, ACMAEA</u> <u>Thais, Chthamalus</u> <u>Littorina scutulata</u>	288	0	X=3.1	133	1		198	16	
7	NO	<u>T. funebris,</u> <u>L. scutulata, Thais</u>	421	4	X=5.2	7	0		69	5	
		<u>Σ</u>	1822			205			352		
						X=51.3			X=88		

Seastar Corner

July 23, 1971

<u>Organism</u>	\bar{X} Sample mean/M ²
<u>Anthopleura xanthogrammica</u> (5-15 cm.)	10.5
<u>A. xanthogrammica</u> (1-5 cm.)	242.4
<u>Pisaster ochraceous</u>	3.1
<u>Acmaea spp.</u>	11.1

Mussel Bed

<u>Mytilus californianus</u>	455.5
<u>Pollicipes polymerus</u>	51.25
<u>Balanus glandula</u>	88
<u>A. xanthogrammica</u>	10.25

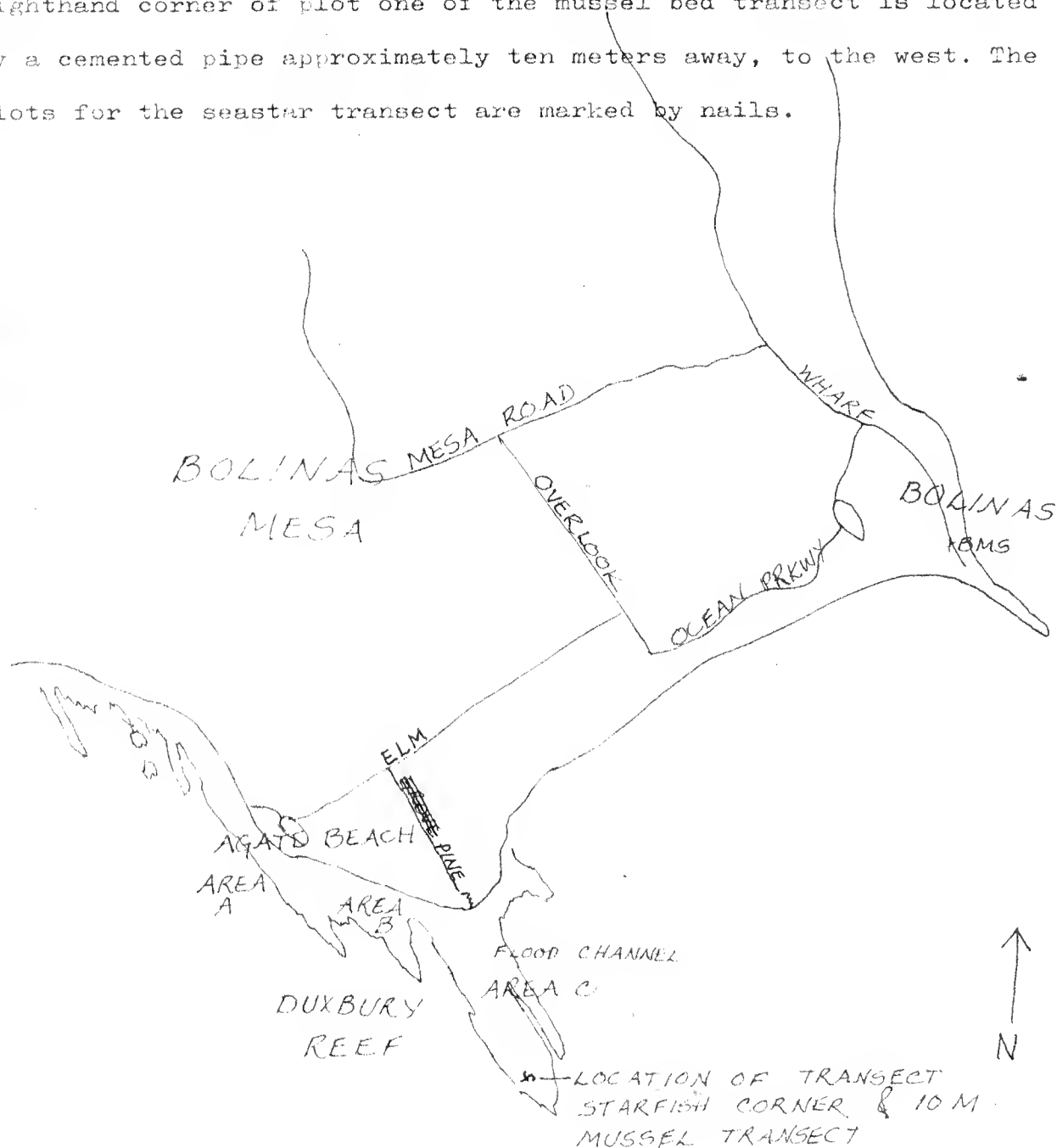
Seastar corner

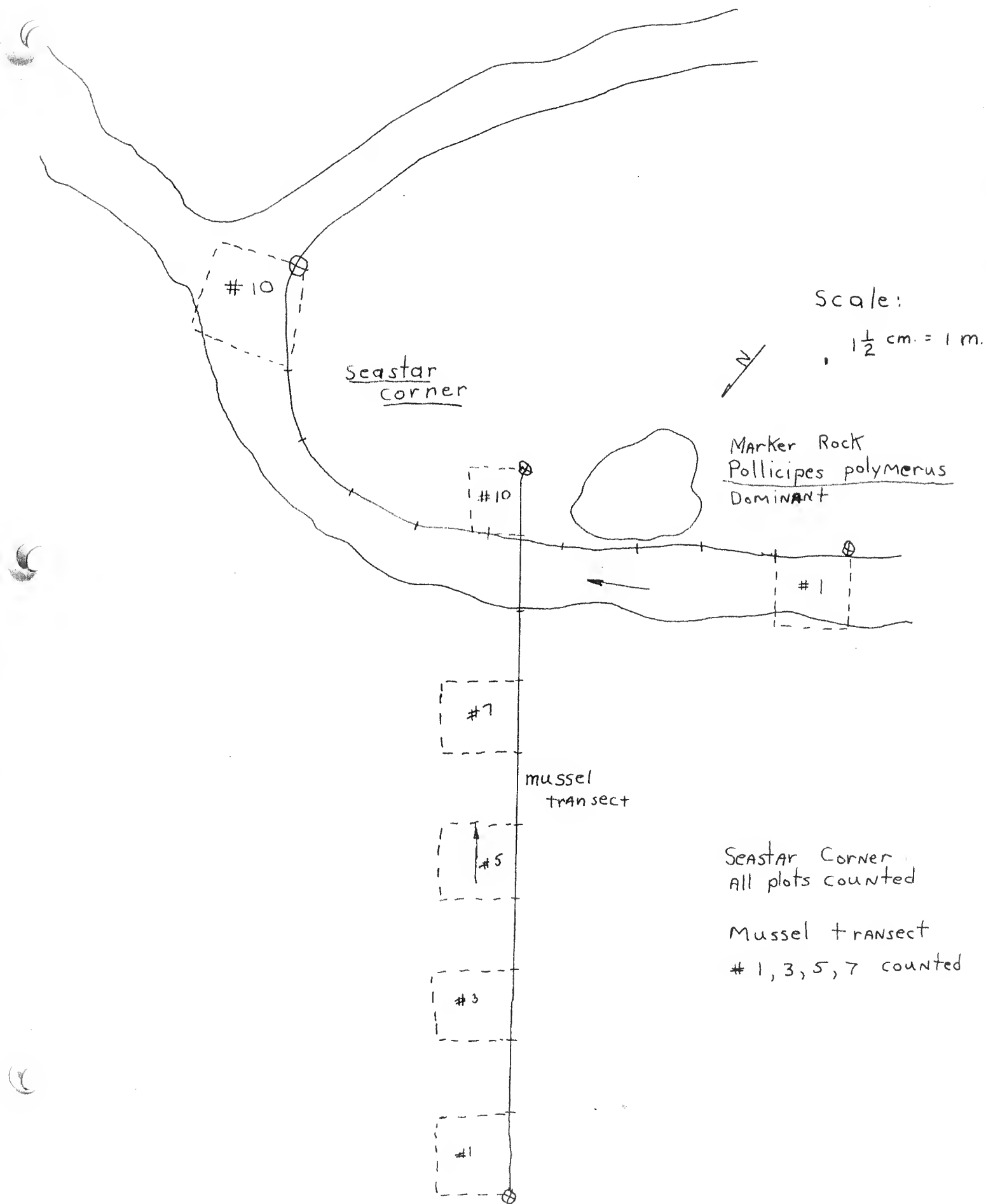
August 9, 1971

<u>P. ochraceous</u>	2.3
<u>Acmaea spp.</u>	12.0

CT-5⁷
34

The transect area, in Area C of Duxbury Reef, can be approached most easily by turning off Elm Street at Pine and following Pine to its end. A trail to the base of the bluff is located at the beginning of Area C. Transect CT-5, at the end of the reef accessible at low tide, can be located by a prominent resistant rock which is a slightly lighter color than the rest of the area, sticks up about 18 inches from the higher bed of the reef, and is barren except for the presence of leaf barnacles. The upper righthand corner of plot one of the mussel bed transect is located by a cemented pipe approximately ten meters away, to the west. The plots for the seastar transect are marked by nails.

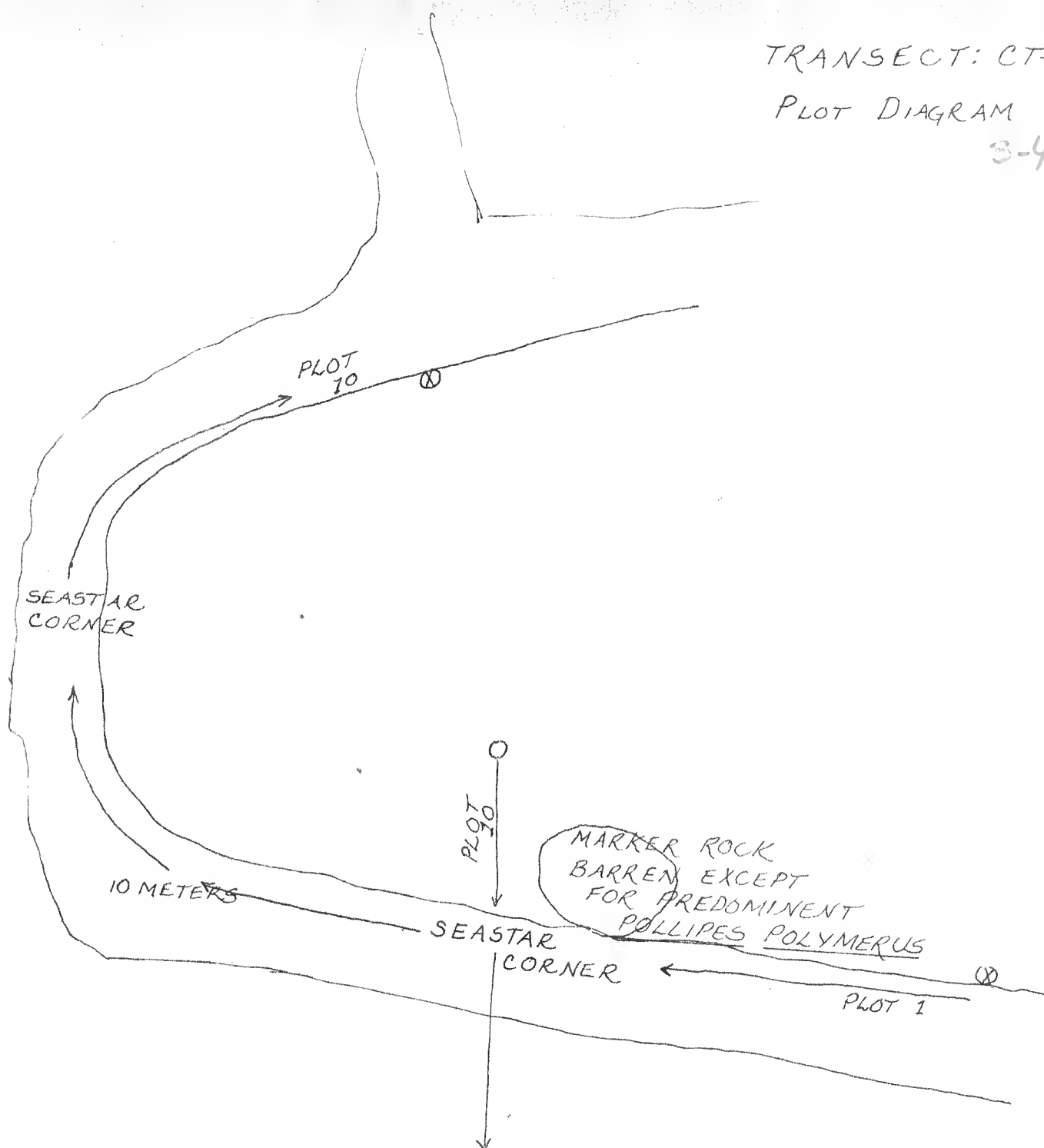




TRANSECT: CT-5

PLOT DIAGRAM

3-4




NOTE: PLOTS 1-10, INCLUSIVE, OF SEASTAR CORNER, WERE COUNTED. FOUR ALTERNATE PLOTS, 1, 3, 5, & 7, OF THE MUSSEL BEDS, WERE COUNTED FOR MYTILUS CALIFORNIANUS & POLLICIPES POLYMERUS.

DUXBURY REEF

AREA C

MUSSEL BED

Transect DX-CT-4

 = square meter
quadrant

* = stake for each
square meter
sample

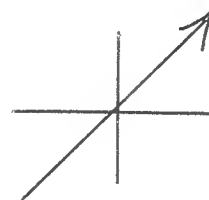
Instructions: Place quadrant
in same relation
to stake as
shown on map;

Corner of quadrant
at stakes #1 and #2--

Center of quadrant
at stakes #3-10.

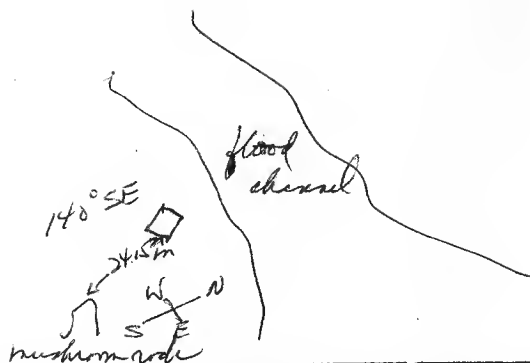


magnetic
North



G. Chan

Study Site DUXBURY REEF
Area C Section 2 Channel _____
Transect CT-6 Type single m²
Other scrapped m² of
damaged substrate
repopulation study
Reference _____
Investigator Inertich, G. Chan



For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 8/10 Tide/Time _____ Water temp 26°C Other pool

Plot #	Oil?	Species=	Organism Count Size=Avg. mm. (S=shells with oil)											
			<u>Acorn scabra</u>			<u>Teg. funicularis</u>			<u>Mopalia</u>			<u>Pagurus samuelis</u>		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
	not visible	Algae, other ulva 85% Fucus Zigartina sp. Halysia	3			21			0			0		

Year 72 Date 7/27 Tide/Time 0.5 4:55 Water temp 15°C Other Alga

Plot #	Oil?	Species=	Organism Count Size= Avg. mm. (S=shells with oil)											
			<u>Ac. scab.</u>			<u>Teg.</u>			<u>Mopalia</u>			<u>Bal.</u>		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
	0	Algae, other ulva Enteromorpha Fucus	18			2			1			62		≤ 1cm.
	0	6/28/72 Zigartina crinita only	10 scabra			78			2 Mopalia			90 Bal		
			19 Zygote						5 Acorn			4 D		3 mm Avg.
									28 Pagurus in small					

de

3-6
DT-7
76

Baleno
Zoe
Acanthina
Tegula

Investigator _____

Year Date Tide/Time Water temp. Other

[illegible]

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

DATA SUMMARY for Study Site DUXBURY REEF Transect CT-3 Oil? ✓ ^(new) ++ n=10m² p. 1

L= live
D= dead; += scars
S= oil on shells
T= on top of oil
N= no oil on shells

		Organisms						
Year	Date		<i>Hydrilla californiana</i> per 10m ²	<i>Polysiphonia</i> per m ²	<i>Aschoplinea</i> <i>parthyrenoides</i> per m ²	<i>Phaeo</i> <i>enigmata</i> per	<i>Mytilus</i> <i>muscosa</i> per	per
1971	4/29	\bar{X}/unit	9.3	225.1 L	3/L	4	1	
		Σ	N ₁ L	2251				
-0.9	++	size						
		change						
1971	5/11	\bar{X}/unit	10.0 L	1603	21		1	
-0.8		size						
		change						
1971	5/23	\bar{X}/unit	9.4 L	2027	(no count)			
-0.9		size						
		change						
1971	6/11	\bar{X}/unit	9.5 L 20	1627	(no count)			
		Σ	10085					
-1.3		size						
		change	large w/ lime					
		\bar{X}/unit						
		size						
		change						
		\bar{X}/unit						
		size						
		change						
		\bar{X}/unit						
		size						
		change						
		\bar{X}/unit						
		size						
		change						

CT-3
oil
10 m²

4/29/71
myst dm²

Rolli fan Other

1	7.0	307	0	
+ 2	8.0	152	7	
+ 3	5.0	203	0	
4	6.0	336	0	4thais
5	5.0	230	10	1 mgp
6	12.0	345	0	
7	15.0	220	0	
8	15.0	180	4	
+++ 9	16.0	255	0	
10	4.0	23	10	
92.0L		2251L	31L	

5/11/71
myst

Rolli fan Other

1	8.0	100	0	
+ 2	9.0	100	0	
+ 3	5.0	100	10	1 mgp
4	6.0	300	6	
5	10.0	200	1	
6	12.0	250	0	
7	15.0	200	0	
8	16.0	150	4	
9	15.0	200	0	
10	4.0	3	0	
100.0		1603L	21L	

5/23/71

1	7.0	200	
+ 2	8.0	120	
+ 3	5.0	190	
4	6.0	330	
5	6.0	220	(same?)
6	12.0	340	
7	15.0	200	
8	15.0	180	
+++ 9	16.0	240	
10	4.0	7	
94.0		2027	

6/11/71

1	7.0	LOD	200	
+ 2	8.0		175	
+ 3	5.0		170	
4	6.0		330	
5	7.0	OD	227	(same?)
6	12.0	10D	300	
7	15.0	OD	200	
8	16.0	15D	165	
+++ 9	15.5	50D	235	
10	4.0	10D	5	
95.0L		85D	1627	

spitachy, slim on
deal empty shells

73

310° NW →

Plot #	Species= Oil? Algae, other	Organism Count Size= Avg. mm. (S=shells with oil)											
		Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size

Study Site Transect #3 (Continued)

Area _____ Section _____ Channel _____

Transect _____ Type _____

Other _____

Reference _____

Investigator _____

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 5/13 Tide/Time 9:08:30 Water temp. 11°C Other Overcast foggy

Plot #	Species=		Organism Count			Size=Avg. mm.			(S=shells with oil)		
			Mytilus Calif			Pollycipes Poly			Acanthopleura		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	Oil?	Algae, other	700	0	8 5/3	200	0				
2			500	0	9/3	120	0				
3			500	0	9/2	190	0				
4			600	0	8 1/2	330	0				
5			600	0	5/2	220	0				
6			1200	0	4.5/2	340	0				
7			1500	0	5/2	200	0				
8			1500	0	4.5/2.5	180	0				
9			1600	0	5.5/2	240	0				
10			400	0	8 1/2	7	0				

Year 1971 Date 6/11 Tide/Time 1:30:12 Water temp. 11°C Other Clear sunny few clouds

Plot #	Species=		Organism Count			Size= Avg. mm.			(S=shells with oil)		
			Mytilus Calif			Pollycipes Poly			Acanthopleura		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
1	Oil?	Algae, other	700	0	8/3	200	0				
2		Healthy	800	0	9/3	125	0				
3		Healthy	500	0	7/2.5	170	0				
4		Healthy	600	0	7/2	330	0				
5		Healthy	700	0	6/2	227	0				
6		Area with slime	1200	10	4.5/1.5	300	0				
7		Healthy	1500		5/2	200	0				
8		Area with slime	1600	15	5/2	165	0				
9		Spotty 1 to 2 dead	1500	50	5.7/2	235	0				
10		Good health.	400	0	8/2.5	5	0				

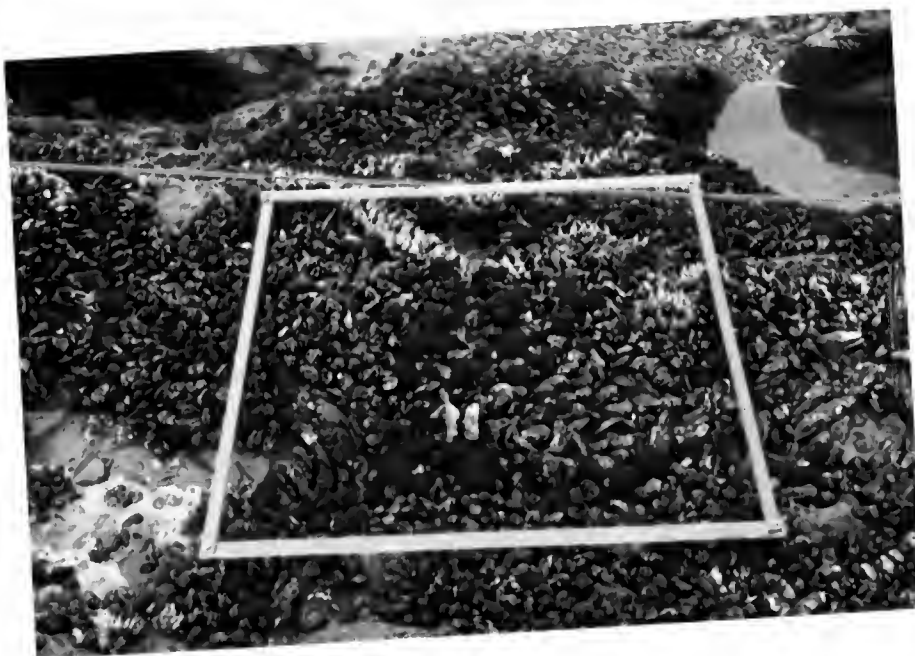
General
limb
wood
with slime on
dead empty
shells.

CT-3

#1



#2

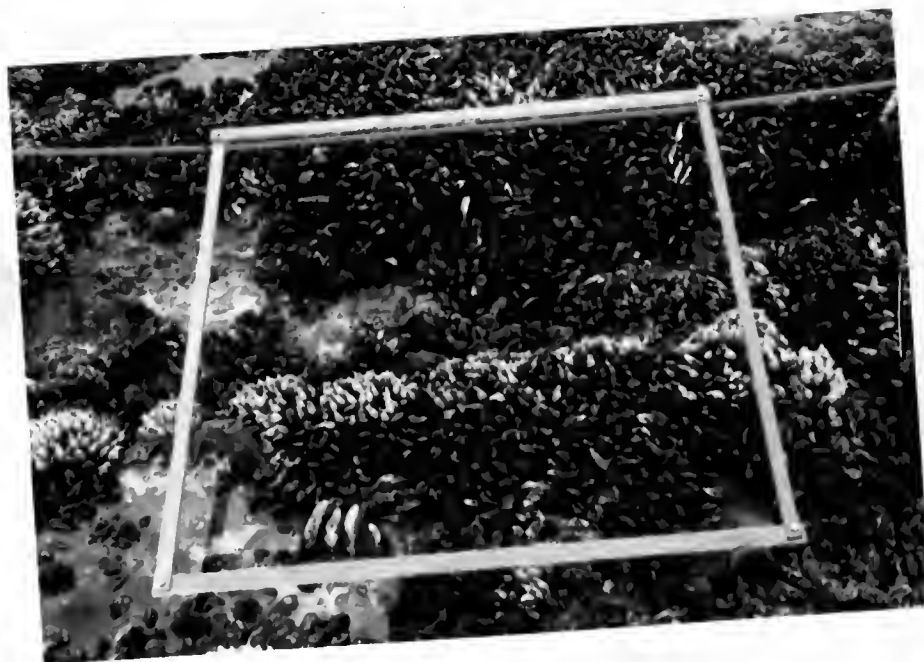


#3



C

#4



#5

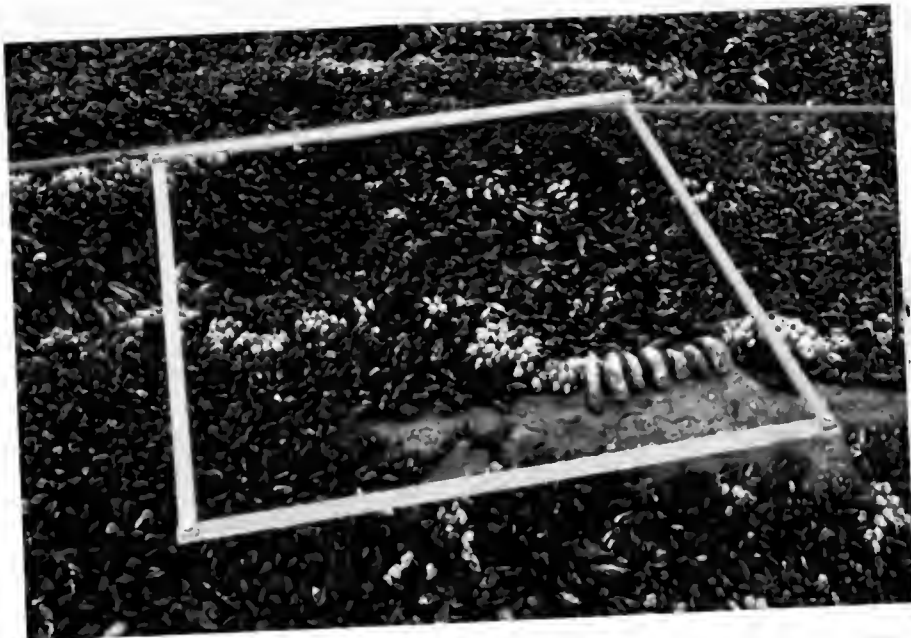


#6



L

#7



#8

R



#9



117

#10



Pictures were taken 4/30/71 at beginning
of study.

mussel strip
succession

DATA SUMMARY for Study Site DUXBURY REEF Transect CT-4a Oil? n= p.

L= live
D= dead; += scars
S= oil on shells
T= on top of oil
N= no oil on shells

Year	Date	Organisms						
			per	per	per	per	per	per
		\bar{X} /unit						
		size						
		change						
		\bar{X} /unit						
		size						
		change						
		\bar{X} /unit						
		size						
		change						
		\bar{X} /unit						
		size						
		change						
		\bar{X} /unit						
		size						
		change						
		\bar{X} /unit						
		size						
		change						
		\bar{X} /unit						
		size						
		change						
		\bar{X} /unit						
		size						
		change						

TRANSECT WORKSHEET - G. Chan

Location - Site Title DUXBURY

Area C Section 4 Transect

Other Mussel succession

Strips 1, 2, 3, 4

(15 feet long strips
by 1 foot width)

Reference

Chan Notes

Conserv. of Dux. P. 27

(Chan = Wilson
No. 2 = X_{10} ; No. 3 = X_{11} ; renamed X_{2-10} , X_{3-11})

CT4a

~~E-S-4~~

TREATMENT STRIPS

Strip 1

2

3

m² patch No. 1

tide pool

4

X_{10}/m^2

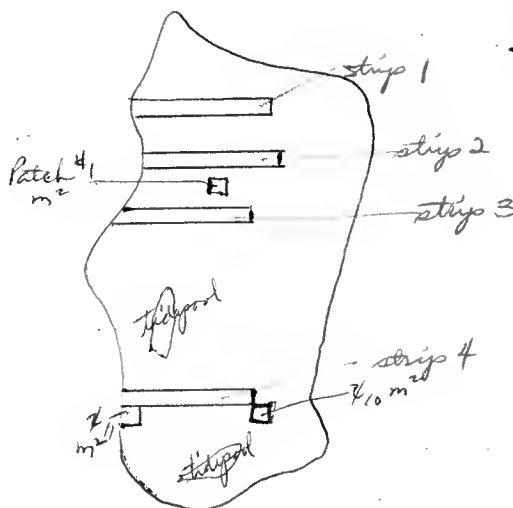
tide pool

X_{11}/m^2

Year	Date	Tide	Other conditions	Plot, Strip	Description
1957	12/2			A	A. Cleared Mussel Strips, 1 foot wide, 15 feet long — strips 1, 2, and 3.
				B	B. Cleared Mussel Patch No. 1, m ²
1967	12/4			C	C. After 10 years, strips 1, 2, and 3 plus patch No. 1 was reconstituted by mussels. Patch No. 1 has 840 mussels.
1971	3/23		10 DM ² AUG: 15	D	→ " " " " 1500 " "
1965	12/5			B	D. Cleared Strip No. 4, 1 foot wide, 15 feet long to repeat A.
			Temperature of m ² X 11		Test 10 mussels with oil $\bar{X} = 21.5^\circ C$ " " " without " $\bar{X} = 21^\circ C$ used Thiemister probe

CT-4a

Investigator _____

[illegible]

<i>Driftlus californianus</i>			Organism Count Size=Avg. mm. (S=shells with oil)													
Plot #	Species=			Strip 1			Strip 2			Strip 3			Strip 4			
	Oil?	Algae, other	Patch #1	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	
	1957	12/2	cleared	cleared mussel			cleared			cleared			cleared			
	1965	12/5											cleared			
	1967	12/4	← S840	oil reconstituted by mussels →												
	1971	3/23	10 dm ² X 8 15 = 1500 ±													
				X 10 dm ² S 840 X 10 dm ² S 840			#1 20 x 8 cm #2 10 x 2 cm #3 6 x 8 cm #4 6 x 8 cm	#1 25 x 7 cm #2 20 x 7 cm #3 10 x 7 cm #4 20 x 7 cm			#1 24 x 6 cm #2 9 x 20 cm #3 130 x 70 cm #4 1			completed mussel shepherd 100 feg 80 Bd 55 com spp		

Year Date Tide/Time Water temp. Other

[illegible]

L= live
D= dead; += scars
S= oil on shells
T= on top of oil
N= no oil on shells

		Organisms					
Year	Date		per m ²	per m ²	per	per	per
		\bar{X}/unit					
		size					
		change					
1970	7/17	\bar{X}/unit	3,100.4	149.4			
	n=8 m ²	Σ	24,823	135			
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					
		\bar{X}/unit					
		size					
		change					

TRANSECT WORKSHEET - G. Chan

Location - Site Title DUXBURY

Area C Section 2 Transect

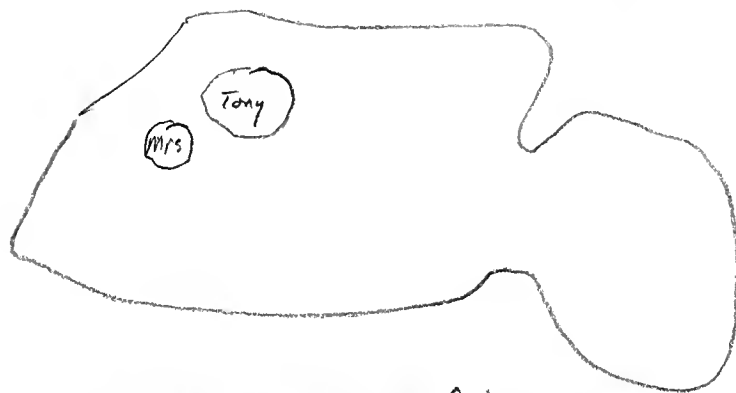
Other Tony's tide pool

Reference

Chan's notes

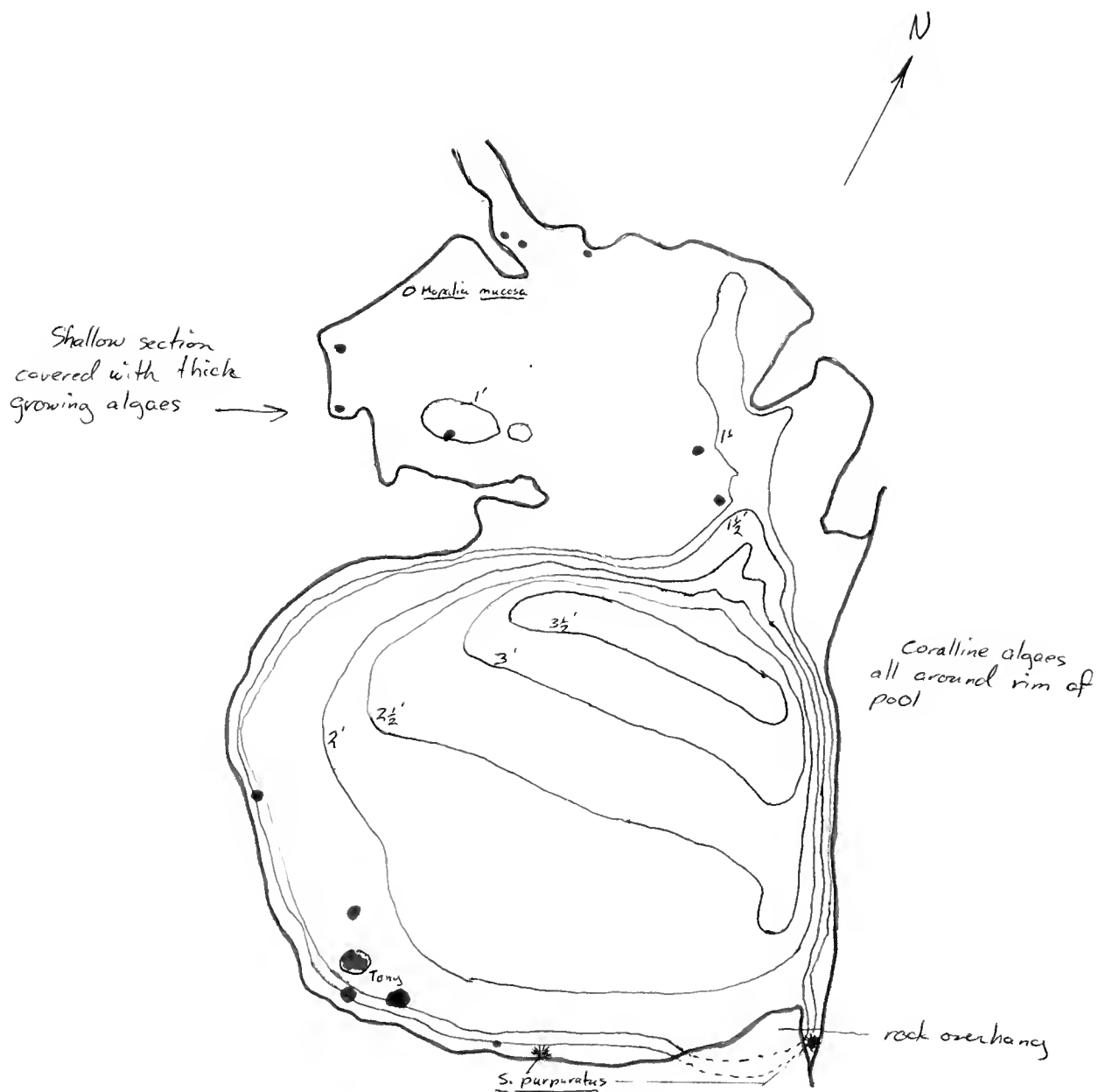
Cham/molina Conser. of Duxbury Reef, P.R.

Tide Pool C-Tony
67-8



Massaged anemone with fingers, used calipers to measure the diameter.

Year	Date	Tide	Other conditions	Plot, Strip	Description		
			<u>clear weather</u>	-	<u>Anthopleura xanthogrammica</u>		
					<u>Column Diameter</u>	<u>Circumference (from T1)</u>	<u>longest tentacle</u>
1958	6/2				6"	18.8"	2"
1968	11/19				8"	25.1	2.5"
1971	1/23						



Contour lines show approximate depths in 6 inch steps.

Bottom of pool covered with large rounded stones. Main organism is hermit crab and occasional sculpin.

- Anthopleura xanthogrammica
- Strongylocentrotus purpuratus

List of organisms found in pool from 3/6/71
to 6/10/71

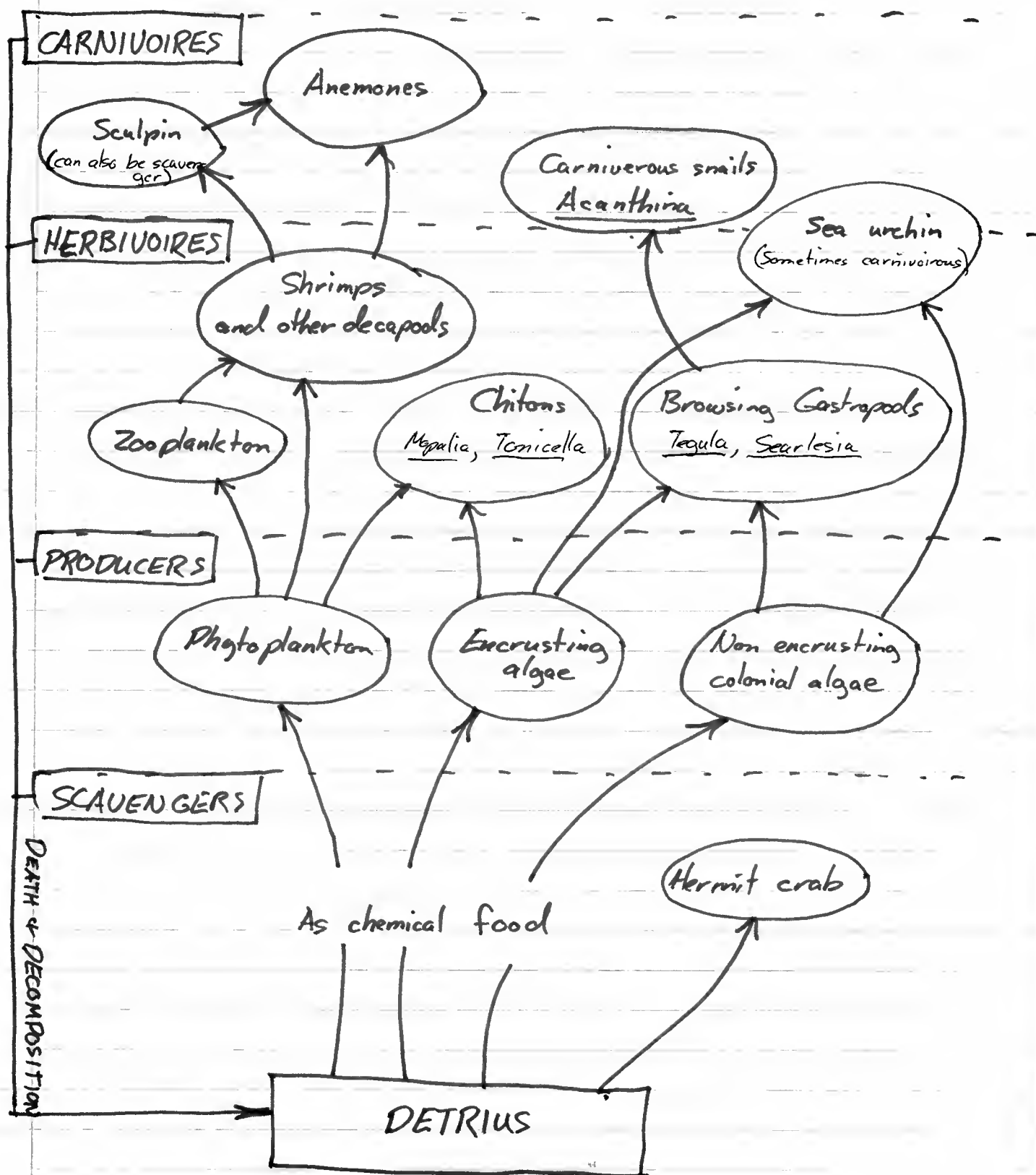
<u>Anthopleura xanthogrammica</u>	green sea anemone
<u>Tegula funebris</u>	black turban
<u>Acanthina spirata</u>	
<u>Searlesia dira</u>	dire whelk
<u>Tonicella lineata</u>	lined chiton
<u>Mopalia mucosa</u>	mossy chiton
<u>Botula californiensis</u>	rock boring clam
<u>Spirontocaris sp</u>	shrimp
<u>Pagurus hemphillii</u>	hermit crab
<u>Strongylocentrotus purpuratus</u>	purple sea urchin
<u>Oligocottus maculosus</u>	tidepool sculpin

< List of algae to be found

<u>Lithothamnion sp</u>	Coralline algae
<u>Calliarthon sp</u>	" "
<u>Corallina sp</u>	" "
<u>Gigartina sp</u>	Encrusting algae
<u>Endocladia sp</u>	

Phytoplankton

Simplified food chain for Tony's Pool



Other associations of A. xanthogrammica include the sea spider Pycnogonum stearnsi, whose larva feed on the juices of its host; and the giant amoeba Trichamoeba schaefferi, which can be found around the base of the anemone.⁵

include this data
with your final
report. ↓

OBSERVATIONS

My observations are in two parts, part one for long term observations on "Tony", and part two for observations and experiments on other anemones on June 7, 1971.

Tony, or Toni, depending on what gender you think it is, lives in a large tidepool on area C of Duxbury Reef. It is a very large Anthopleura xanthogrammica, measuring over 40 cm in circumference at the base. It lives in 20 inches of water attached to the south end of its pool. My first observation was March 6, 1971, and since then I have made six others. In all cases it has been closed, leaving a hole just large enough for siphonoglyph water circulation. There are no bits of shells attached to its epidermis as most other anemones in the area have, especially those exposed to air. In all my observations the pool water temperature has not varied more than 2° from 12° C. Tony's temperature is the same as the surrounding water.

Tony get very little sun attached to the south end of the pool, so it probably isn't as green as some of the others, and also it stays closed most of the time.

5. Ricketts and Calvin, Between Pacific Tides pp 52, 320

My conclusions with Tony are that he is old and tired, and doesn't have the get up and go of the younger Anthopleura. Since he is quite large, he is capable of taking larger prey, which may account for his being closed so often, because he requires less food, and takes more time in digesting larger prey.

many people know him & try to force feed him. Perhaps he is conditioned!

On June 7, at the -0.6 tide at 5:30 AM I came out to Duxbury to perform some experiments and make observations of other ~~an~~ Anthopleura xanthogrammica.

My first one was to test light reaction. At 5:30 it was still very dark. I first shined a bright flashlight on an anemone that was closed; Tony. After three minutes there was no visible reaction.

Next the procedure was repeated using anemones that were half open, and totally open. There was a slight waving of tentacles with the half open one, and no visible reaction from the totally open one. My conclusion is that Anthopleura xanthogrammica has no reaction to light, or is very slow at responding. Perhaps intensity of the order of magnitude the sun has is } necessary for a reaction, but there was no change in any of these three after sunrise dimmed by fog. } agreed.

My second observation involved taking the temperatures of sea anemones in the water, and exposed to air. The air temperature was 51°F with no direct sunlight to warm the water or exposed rock. The water temperature in small pools with anemones was 51°F also. The temperature of anemones both in the air and the water were no more than half a degree from 51°F . My conclusions are that anemones have such a low rate of

metabolism that it is not capable of being recorded in temperature using an ordinary thermometer.

For my third observation I counted anemones to see ~~how many~~ what percentage were closed, half open, or fully open at low tide. I did this for twenty submerged in water, and twenty exposed to air.

In the twenty ones in the water, approximately 30% were shut, 50% half open, and 20% totally open.

For the exposed ones, 95% were shut, 5% were partially open, but none were more than half open.

I concluded that the main factor involving whether an anemone is open or not is the water level.

At high tide I would expect that 95% of those anemones ~~shut~~ that were exposed to air at low tide would open.

after Hedy's
observations.

For my final observation or experiment I took bits of shell and placed them on exposed parts of anemones both above and below water. I intended to find out how long it would take for them to adhere. At the end of a half hour they were not attached in either case. My conclusion was that it must take possibly several hours, the period necessary for a loose shell to be undisturbed by wave action at low tide, which is the only time it could be adhered to.

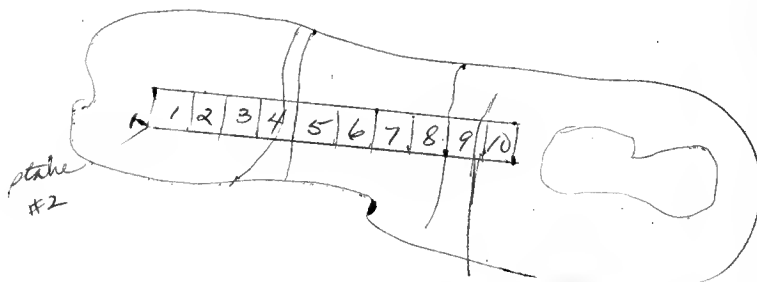
or when mucus is
heavily secreted.

My conclusions in writing this paper are that sea anemones are really more impressive than one would think the first time he saw one. Anthopleura xanthogrammica is a very advanced coelenterate. It has no predators and may even outline human beings.

→ Samoans eat them!

CT-8
p1

Reference _____
Investigator _____



Year 1977/Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

Year Date Tide/Time Water temp. Other

[illegible]

CT-9

72

4

West

9	7	5	3	1
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 East

Reference Wishard Meredith, Chan

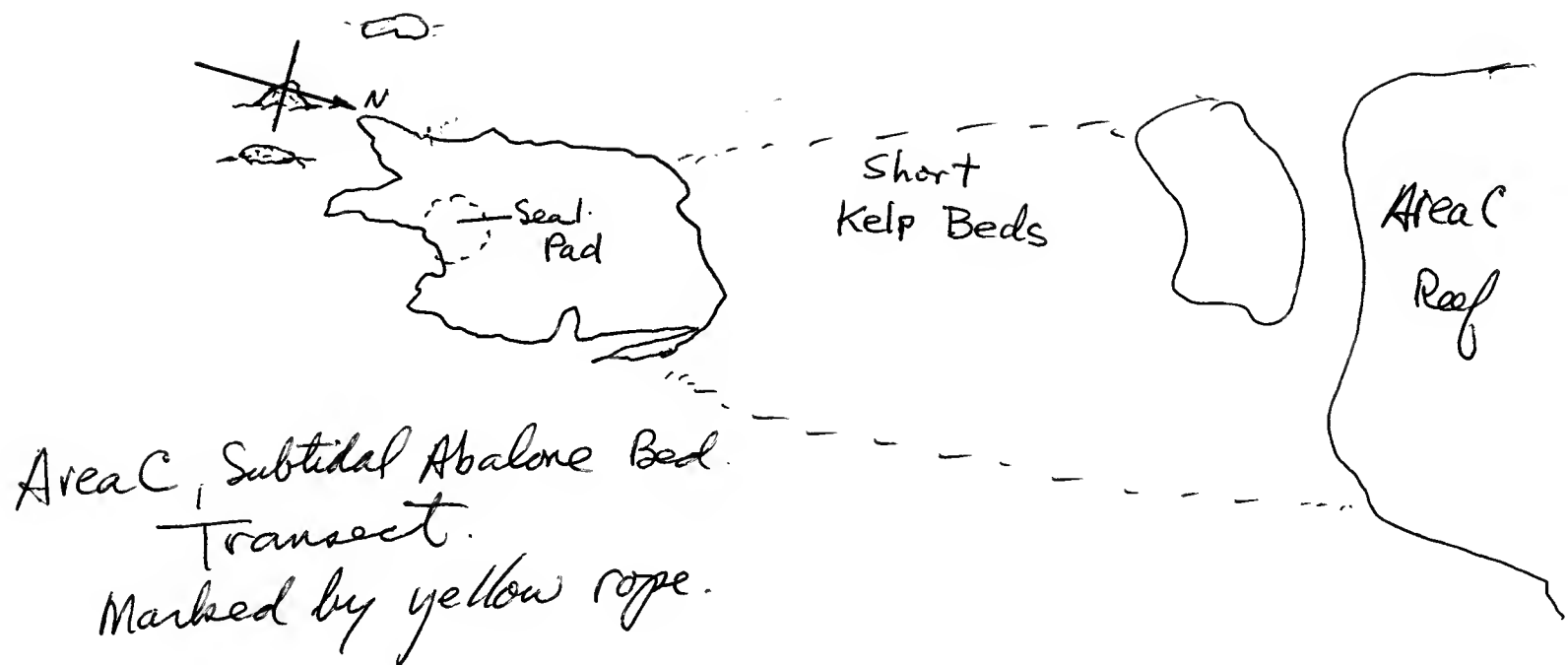
Investigator _____

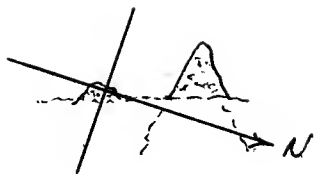
Year 1977/Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

			Organism Count. Size= Avg. mm. (S=shells with oil)											
Plot #	Species=		Live			Dead			Live			Dead		
	Oil?	Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size





Shark Tooth Rock Abalone Transect.
Marked by yellow rope

Area B
Reef

Area C Reef

~~✗~~ Tony's
Pool

CT-14

CT-15
p2

Reference see Ziegler's notes
Investigator Sp1 = Ziegler

<u>Year</u>	<u>Date</u>	<u>Tide/Time</u>	<u>Water temp.</u>	<u>Other</u>
-------------	-------------	------------------	--------------------	--------------

Year Date Tide/Time Water temp. Other

[illegible]

CT-N^x
p3

Area C Section Channel

Transect _____ Type _____

Other Zone 4, m² every 50 m

0 2, m² every 25 m

Reference

Investigator _____

see map

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

[illegible]

COT-15

ρ_i

Area C	Section	Channel
---------------	---------	---------

Transect Type

Other CZ4, M² EVERY 50 METERS

CZ 2, M² EVERY 25 METERS

Reference

Investigator CARL ZEICLER

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1977 Date July 23 Tide/Time -0.8 / 6:42 AM Water temp. 55°F Other _____

ZONE 4 JULY 24 ^{ADD} -0.5 / 7:12 AM Organism Count Size-Avg. mm. (S-shells with oil)

[illegible]

Year 1971 Date JULY 25 Tide/Time 0.0 / 7.42 Water temp. 59°F Other _____

ZONE 2 JULY 27 1.0 / 8:42 AM Organism Count Size- Avg. mm. (S=shells with oil)

[illegible]

► AREA C

- 1. SEA URCHIN TRANSECT C²Z₄, 10 PLOTS
 - S. purpuratus LIVE \bar{X} = 15.2/m²
 - DEAD \bar{X} = 0/m²
 - ALGAE _____ \bar{X} = 82%/m²
 - OIL _____ = NONE

- BORING CLAM TRANSECT CZ₂, 10 PLOTS
 - LIVE CLAMS ————— $\bar{x} = 7.3/m^2$
 - DEAD CLAMS ————— $\bar{x} = 2.3/m^2$
 - ALGAE ————— $\bar{x} = 82\%/m^2$
 - OIL : PLOTS 8, 9, 10 ————— = LESS THAN 25%
PLOTS 1, 2, 3, 4, 5, 6, 7 = NONE

- \bar{X} OF ALGAE FOR 20 PLOTS = $82\%/m^2$

- 4 -

6	NO	90%	65L	OD
5	NO	95%	39L	OD
4	NO	95%	0L	OD
3	NO	90%	20L	OD
2	NO	25%	0L	OD
1	NO	95%	26L	OD
		<u>815 + 10</u>	<u>152L</u>	<u>OD</u>
		$\bar{x} = 82\%$	$\bar{x} = 15.2L$	<u>OD</u>

Year 1971 Date July 25 Tide/Time 0.0 / 7:42 AM Water temp. 59°F Other _____

Zone 2 ^{JULY 27}

1.0 / 8:42 AM

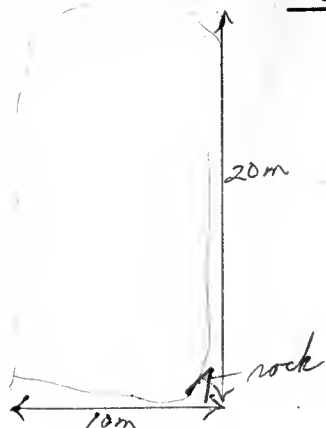
Organism Count Size= Avg. mm. (S=shells with oil)

[illegible]

TRANSECT WORKSHEET - G. Chan
January, 1971

37
CT-10
p1

Study Site DUXBURY REEF
Area C Section 3 Channel
Transect CT-10 Type Swamp
Other 16m x 20m
Total count of owl limpets
for entire area
Reference
Investigator



For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 2/23 Tide/Time Water temp. Other

		Organism Count Size=Avg. mm. (S=shells with oil)									
Plot #	Oil?	Species= Algae, other	<i>Lotha gigantea</i>								
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
		1971 7/23	22								
		-0.2 3/5 @ 1:30 PM	19								
		7/23	11								

Year 72 Date 4/16 Tide/Time 1:23 PM Water temp. 15.9 Other Clear

Year	12	Date	7/6																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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me

TRANSECT WORKSHEET - G. Chan
January, 1971

3-8
CT-11
p1

Study Site DUXBURY REEF

Area C Section 3 Channel

Transect CT-11 Type Linear 10m

Other Total count of Anthoglossa
anthoglossa in 10m
linear crevice

Reference

Investigator

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 2/23 Tide/Time Water temp. Other

Plot #	Oil?	Species=	Organism Count Size=Avg. mm. (S=shells with oil)								
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
		1971 2/23	56								
		-0.6 3/23	55			3/23/71					
		7/23	54		6mm	13.5 submerged					
		8/10	54			13.8 not submerged					

Year 72 Date 4/16 Tide/Time 1507.23 Water temp. Other

Plot #	Oil?	Species=	Organism Count Size= Avg. mm. (S=shells with oil)								
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
		Ant. Xanth.									
		Total lt.	55								
		1972 4/28	71	51	16.4						
		file temp			2" di						

mc

Study Site DUXBURY REEF

Area C Section 1 Channel 1

Transect CT-12 Type Pierre, single, m²

Other 1 mm nylon mesh, washed
sand in buckets of seawater. Count heads.
Replaced onto sand.

Reference _____

Investigator _____

1 m² of Saccoglossus sp.

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 7/10 Tide/Time -1.20 Water temp. _____ Other clear

			Organism Count Size=Avg. mm. (S=shells with oil)								
Plot #	Species=		Live			Dead			Size		
	Oil?	Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
<u>single</u>		<u>m², 10 cm deep</u>	<u>20</u>								

Year 72 Date 7/16 Tide/Time -1.4 7:23 Water temp. 50 Other clear

			Organism Count Size= Avg. mm. (S=shells with oil)								
Plot #	Species=		Live			Dead			Size		
	Oil?	Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
<u>0</u>		<u>parts =</u>	<u>33</u>								
<u>72</u>		<u>6/28 =</u>	<u>30</u>								

unc

CT-13, 14,

Seal Island

Kelp

Kelp

4/30/71

X

[illegible]

3-11
CT-14, 13, 8
p1 p2

Other Shark ^{Tooth} Rocks

Year 1971 Date 7/8 Tide/Time _____ Water temp. _____ Other _____

[illegible]

Year Date Tide/Time Water temp. Other

[illegible]

			Organism Count Size= Avg. mm. (S=shells with oil)																	
Species=			Live			Dead			Live			Dead			Live			Dead		
Plot #	Oil?	Algae, other	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size			

3-11

BP-1

AT-15

TRANSECT WORKSHEET - G. Chan

Location - Site Title

Duxbury-Bolinas Pt.

Area Section Transect

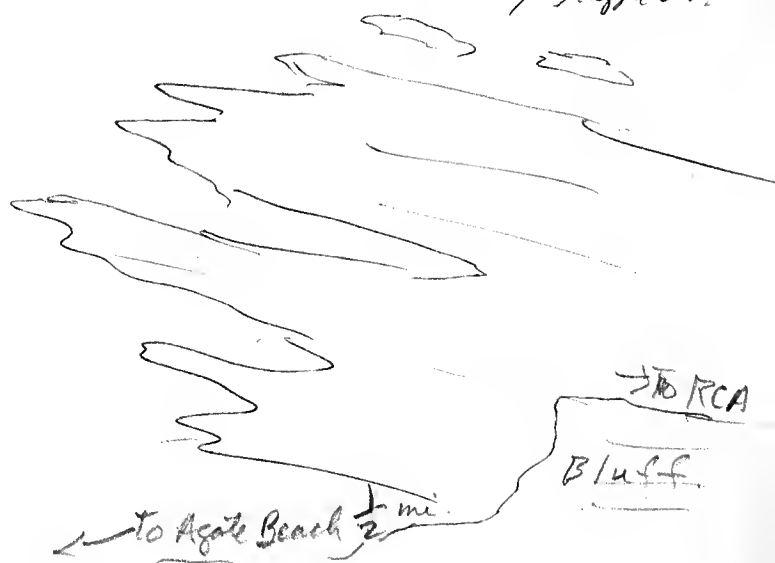
Other

South Bolinas Pt. Reef

Reference

Notes

Wash Rock.
Concrete block
w/ 3 tagged abs.



Year	Date	Tide	Other conditions	Plot, Strip	Description
1968	6/26	-0.9			3 Tagged abalones - wire tags 9", 7 7/8", 7 3/4"
1969	6/23	-1.1	5:30am		Checked on 2 abs - still present after one year; 9" ab missing.

SA
FB
—
SB
DB

TRANSECT WORKSHEET - G. Chan
January, 1971

Study Site FORT BAKER

Area _____ Section _____ Channel _____

Transect FB-1 Type 5 dm² samples in

Other each m²

North Tower 1st chain link fence, posts through Ft Baker
Ft Baker L. Baker Block

Reference 2x2 dm² samples

Investigator transect line laid on higher level of rocks than rocks near water (3rd line yards)

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

Organism Count Size-Avg. mm. (S-shells with oil)

Plot #	Species=		Organism Count			Size-Avg. mm.			(S-shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
ocean side of transect line	Oil?	Algae, other									

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

Organism Count Size-Avg. mm. (S-shells with oil)

Plot #	Species=		Organism Count			Size-Avg. mm.			(S-shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
	Oil?	Algae, other									

Golden Gate
170m
space

Fort Baker

5.1

Golden Gate Bridge

Painted range

8 ft post
from coast
gate post

pier

road from pier

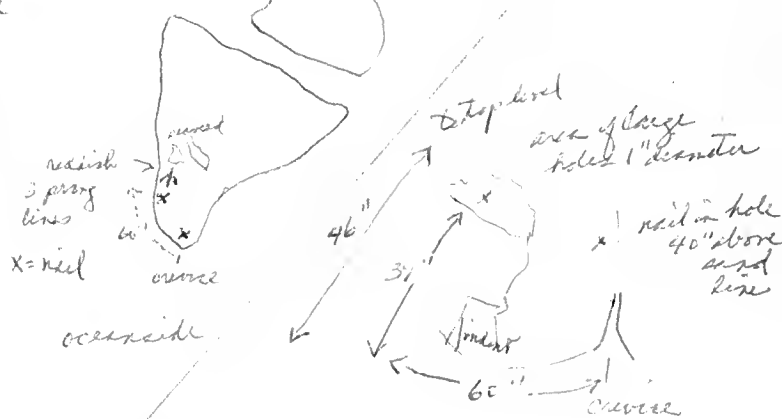
overrun

diff seri

DB-3

Other Red near ocean is not quite
at high or level of tidal pool island,
about 8" beyond red dish mark,
on top of island

Reference

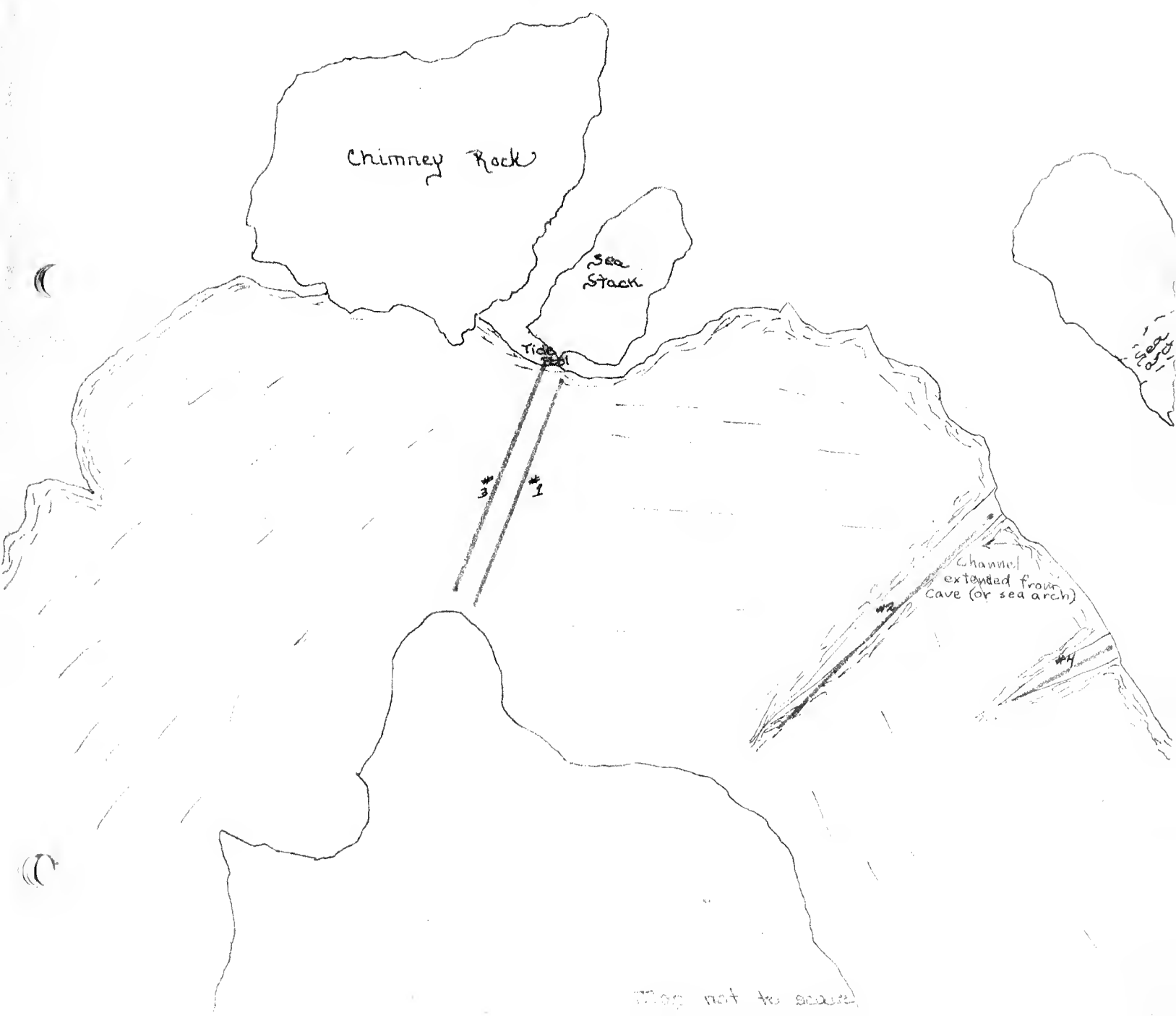
[illegible]

C
R
B
R
U
P

OR-1, 2, 3, 4

Intertidal

20 meters



Map not to scale

DATA

Porifera

Leucoselinia healthi

Coelenterata

Anthopleura elegantissimaAnthopleura xanthogrammicaEsiactis prolifera

Annelids

Glycera americanaSabella vermicularis

Arthropoda

Pagurus samuelisPagurus hirsutiusculusPugetia productaPycnogonum stearnsiCancer antennariusPetrolisthes cinctiposParaligaster cavicaudaBalanus glandulaIdothea vesicataDemigrapsus nudus

Mollusca

Hydrobia ulvaeLittorina ulanaxisLittorina scutulataTegula funebrisAcmaea limatulaAcmaea digitalisAcmaea scabraCryptochiton stelleriLopalia ligiosaAcmaea scutumThais emarginataAcmaea mitraTegula brunneaMinimitea multirugosusThais lamellosaCrepidula adunca

Echinodermata

Patiria miniataLeptasterias aequilliaStrongylocentrotus purpuratusLycnophoda helianthoidesPisaster ochraceus

	# of quadrats sampled	Total # of specimens	\bar{x}	$(\sum_{i=1}^n x_i)^2$	$\sum_{i=1}^n x_i^2$	S^2	S	Confidence Interval
<u>Anthopleura elegantissima</u>	62	1,838		3,844	1,723	50.203	7.085	$-.537 \leq \mu \leq 4.195$
<u>Anthopleura xanthogrammica</u>	7	.212		49	21	.609	.78	$-.053 \leq \mu \leq .477$
<u>Esiactis prolifera</u>	46	1,393		2,116	890	25.608	5.060	$-.329 \leq \mu \leq 3.125$
<u>Glycera americana</u>	1	.03		1	1	.03	.173	$-.028 \leq \mu \leq .088$
<u>Sabella vermicularis</u>	3	.09		9	9	.272	.521	$-.087 \leq \mu \leq .267$
<u>Pagurus samuelis</u>	47	1,424		2,209	385	4,939	3,152	$.35 \leq \mu \leq 2,498$
<u>Pagurus hirsutiusculus</u>	12	.363		144	122	3,676	1,917	$-.29 \leq \mu \leq 1.06$
<u>Pugetia producta</u>	8	.242		64	18	.501	.707	$-.001 \leq \mu \leq .483$
<u>Pycnogonum stearnsi</u>	27	.818		729	321	9,340	3,056	$.409 \leq \mu \leq 1,227$
<u>Cancer antennarius</u>	5	.151		25	9	.257	.506	$.084 \leq \mu \leq .218$
<u>Petrolisthes cinctipos</u>	56	1,646		3,136	3136	45,030	9,748	$.390 \leq \mu \leq 3,002$
<u>Paraligaster cavicauda</u>	2	.06		4	2	.058	.240	$.029 \leq \mu \leq .096$
<u>Balanus glandula</u>	3488	105,646		12,166,144	6,395,684	189,344,155	433,986	$.4759 \leq \mu \leq 163,850$
<u>Idothea vesicata</u>	4	.121		16	10	.297	.544	$.049 \leq \mu \leq .193$
<u>Demigrapsus nudus</u>	17	.515		289	227	6,820	2,611	$.166 \leq \mu \leq .864$
<u>Hydrobia ulvae</u>	20	.606		400	120	3,371	1,836	$.360 \leq \mu \leq .852$
<u>Littorina ulanaxis</u>	2590	78,484		6,208,100	1,997,300	54,063,152	236,776	$.46757 \leq \mu \leq 110,211$
<u>Littorina scutulata</u>	30	.909		900	404	11,772	3,431	$.510 \leq \mu \leq 1,368$
<u>Tegula funebris</u>	151	4,575		22,801	5835	160,751	12,678	$2.877 \leq \mu \leq 6,273$
<u>Acmaea limatula</u>	24	.727		576	576	17,454	4,177	$.168 \leq \mu \leq 1,286$
<u>Acmaea digitalis</u>	41	1,242		1,681	925	27,314	5,226	$.542 \leq \mu \leq 1,942$
<u>Acmaea scabra</u>	89	2,646		7,921	2,991	85,967	9,271	$1.454 \leq \mu \leq 3,938$
<u>Cryptochiton stelleri</u>	8	.242		64	14	.376	.613	
<u>Lopalia ligiosa</u>	7	.212		49	17	.484	.695	$.130 \leq \mu \leq .294$
<u>Acmaea scutum</u>	15	.454		225	225	6,818	2,611	$.105 \leq \mu \leq .803$
<u>Thais emarginata</u>	76	2,303		5,776	5,620	170,155	13,044	$.559 \leq \mu \leq 4,050$
<u>Acmaea mitra</u>	3	.09		9	9	.272	.521	$.021 \leq \mu \leq .159$
<u>Tegula brunnea</u>	3	.09		9	9	.272	.521	$.021 \leq \mu \leq .159$
<u>Minimitea multirugosus</u>	2	.06		4	4	.121	.347	$.014 \leq \mu \leq .106$
<u>Thais lamellosa</u>	3	.09		9	9	.272	.521	$.021 \leq \mu \leq .159$
<u>Crepidula adunca</u>	10	.303		100	52	1,536	1,236	$.138 \leq \mu \leq .468$
<u>Patiria miniata</u>	9	.272		81	17	.454	.673	$.182 \leq \mu \leq .362$
<u>Leptasterias aequillia</u>	44	1,333		1,936	322	8,229	2,868	$.949 \leq \mu \leq 1,717$
<u>Strongylocentrotus purpuratus</u>	54	1,636		2,916	1,642	30,558	5,527	$.896 \leq \mu \leq 2,376$
<u>Lycnophoda helianthoides</u>	6	.181		36	8	.215	.463	$.119 \leq \mu \leq .243$
<u>Pisaster ochraceus</u>	10	.303		100	18	.405	.636	$.218 \leq \mu \leq .388$

INTERTIDAL SAMPLING : Location Chimney RockDate July 7, 1970

Specific Area _____

Tide -.2 Time 8:43amBaseline Intervals _____
metersTRANSECT NO. 1Recorder Karin O'BrienX₂X₄X₆X₈X₁₀(Scientific name
and numbers of
each organism)

FLORA

Iridaea splendens
Spongomorpha
Gigartina
cristata
G. canaliculata
Ralfsia
Corallina
Phyllospadix
Ulva

FLORA

Iridaea splendens
Gigartina
cristata
G. canaliculata
Spongomorpha
Corallina
Egrecia
Ulva

FLORA

Iridaea splendens
Gigartina
cristata
G. canaliculata
Ralfsia
Corallina
Phyllospadix
Ulva

FLORA

Iridaea splendens
Gigartina
cristata
G. canaliculata
Ralfsia
Phyllospadix
Ulva

FLORA

Egrecia
Gigartina
cristata
G. canaliculata
Egrecia
Ulva

FAUNA

Balanus
glandula (78)
Epiactis
porrifera (3)
Cancer
antennarius (1)
Pagurus
samuelis (5)
Strongylocentrotus
pupuratus (2)
Leptasterias
aequillis (2)
Haliotis
rufescens (1)

FAUNA

Balanus
glandula (150)
Pagurus
samuelis (1)
Pugettia
producta (3)
Heptasterias
pusilla (3)
Pycnogonid
stearnsi (14)
Littorina
planaxis (10)

FAUNA

Balanus
glandula (150)
Pagurus
samuelis (1)
Anthopleura
elegantissima (7)
Idothea
rescata (3)
Tegula
funnebralis (19)
Hemigrapsus
nudus (1)
Pagurus
hirsutiusculus (1)
Pycnogonid
stearnsi (11)

FAUNA

Balanus
glandula (300)
Acmaea
limintada (24)
Acmaea
digitalis (14)
Acmaea
scabra (7)
Pagurus
hirsutiusculus (1)
Tegula
funnebralis (1)
Pagurus
samuelis (12)
Pisaster
ochraceous (1)

FAUNA

Cryptochiton
stelleri (2)
Strongylocentrotus
pupuratus (5)
Haliotis
rufescens (1)
Tegula
funnebralis (7)
Sabella
vermicularis (3)
Leptasterias
aequillis (1)
Pisasterochraceous
(2)
Petrolisthes
cinctipes (56)
Hemigrapsus
nudus (15)
Pagurus
samuelis (4)

INTERTIDAL SAMPLING : Location Chimney RockDate July 7, 1970

Specific Area _____

Tide -.2 Time 9:40amBaseline Intervals _____
metersTRANSECT NO. 1Recorder Karin J. O'BrienX 12X 14X 16X 18X 20(Scientific name
and numbers of
each organism)

(sandy area)

FLORA

Egregia
Iridaea
splendens

FAUNA

Pugettia
producta (2)

FLORA

Ulva
Iridaea
splendens
Porphyra
perforata
Gigartina
crustata
G. canaliculata
Spongomorpha
Phyllospadix

FAUNA

Tegula
funeralis (3)
Littorina
planaxis (640)

FLORA

Iridaea
splendens
Gigartina
canaliculata
G. cristata
Corallina
Phyllospadix

FAUNA

Acmaea
scabra (50)
Acmaea
digitalis (27)
Littorina
planaxis (740)
Balanus
glandula (270)
Idothea
rescecata (1)
Pagurus
samuelis (3)
Mopalia
lingnosa (2)

FLORA*

none

FAUNA

Tegula
funeralis (65)
Littorina
planaxis (200)

FLORA

Ralfsia
Pelvetia
Fucus
Gigartina
crustata
Endocladium

FAUNA

Mopalia
lingnosa (3)
Acmaea
scutum (15)
Acmaea
scabra (5)
Balanus
glandula (2500)
Littorina
planaxis (1000)
Thais
emarginata (75)
Anthopleura
elegantissima (40)

INTERTIDAL SAMPLING : Location Chimney RockDate July 7, 1970Specific Area Tide - .2 Time 8:48amBaseline Intervals
metersTRANSECT NO. 2Recorder Karin O'BrianX₁X₃X₅X₇X₉(Scientific name
and numbers of
each organism)

FLORA

Egregia
Iridaea splendens
Microcladia
Corallina
Gigartina
canaliculata
Ulva
Phyllospadix

FLORA

Iridaea splendens
Egregia
Corallina
Costaria costala
Phyllospadix
Gigartina
canaliculata
Odanthalia

FLORA

Egregia
Costaria costala
Microcladia
Spongomorpha
Odanthalia
Gigartina
canaliculata
Ulva
Corallina
Desmarestia

FLORA

Costaria costala
Egregia
Microcladia
Spongomorpha
Odanthalia

FLORA

Gigartina
canaliculata
Phyllospadix
Iridaea splendens
Ulva
Spongomorpha

FAUNA

Pagurus samuelis
(3)
Strongylocentrotus
purpuratus (2)
Leptasterias
aequalis (1)
Pycnogonum
stearnsi (2)

FAUNA

Haliotis rufescens
(3) to 6"
Leptasterias
aequalis (12)
Cryptochiton
stelleri (1)
Pycnogodia
helianthoides
(1)

FAUNA

Leptasterias
aequalis (10)
Pisaster
ochraceous (1)
Patiria miniata
(1)

FAUNA

Leptasterias
aequalis (7)
Pisaster
ochraceous (2)
Tegula brunnea
(3)
Epiactis
prolifera (1)
Strongylocentrotus
purpuratus (2)
Haliotis
(2) rufescens
Acmaea mitra
(3)
Cancer
antennarius
(2)

FAUNA

Haliotis rufescens
(1) - 3"
Parurus samuelis
(12)
Pugettia producta
(2)
Pycnogodia
helianthoides (1)

INTERTIDAL SAMPLING : Location Chimney RockDate July 7, 1970Specific Area Tide -.2 Time 8:48amBaseline Intervals
metersTRANSECT NO. 2Recorder Karin O'Brien

<u>X11</u>	<u>X13</u>	<u>X15</u>	<u>X17</u>	<u>X19</u>
(Scientific name and numbers of each organism)				
FLORA	FLORA	FLORA	FLORA	FLORA
<u>Odonthalia</u> <u>Iridaea splendens</u> <u>Egrecia</u> <u>Ulva</u> <u>Corallina</u> <u>Gigartina</u> <u> cristata</u> <u>Microcladia</u> <u>Prionitis</u>	<u>Spongomorpha</u> <u>Gigartina</u> <u> canaliculata</u> <u>G. cristata</u> <u>Iridaea</u> <u> splendens</u> <u>Microcladia</u> <u>Prionitis</u>	<u>Gigartina</u> <u> cristata</u> <u>Egrecia</u> <u>Spongomorpha</u> <u>Iridaea</u> <u> splendens</u> <u>Odonthalia</u> <u> floccosa</u> <u>Gigartina</u> <u> canaliculata</u> <u>Ulva</u> <u>Ralfsia</u>	<u>Spongomorpha</u> <u>Iridaea</u> <u> splendens</u> <u>Gigartina</u> <u> canaliculata</u> <u>G. cristata</u> <u>Ralfsia</u> <u>Corallina</u>	none
FAUNA	FAUNA	FAUNA	FAUNA	FAUNA
<u>Pycnopodia</u> <u>helianthoides</u> (2) <u>Anthopleura</u> <u> xanthogrammica</u> <u> (2)</u> <u>Strongylocentrotus</u> <u> purpuratus</u> (1) <u>Patiria miniata</u> <u> (2)</u> <u>Epiactis</u> <u> prolifera</u> (26)	<u>Pycnopodia</u> <u>helianthoides</u> <u> (1)</u> <u>Cancer</u> <u> antennarius</u> <u> (2)</u> <u>Strongylocen-</u> <u> trotus</u> <u> purpuratus</u> <u> (40)</u> <u>Leptasterias</u> <u> aequilllis</u> (3)	<u>Cryptochiton</u> <u> stelleri</u> (2) <u>Pugettia</u> <u> producta</u> (1)	<u>Haliotis</u> <u> rufescens</u> (2) <u>Anthopleura</u> <u> xanthogrammica</u> <u> (4)</u>	none

INTERTIDAL SAMPLING : Location Chimney RockDate July 7, 1970

Specific Area _____

Tide .2 Time 8:48amBaseline Intervals _____
metersTRANSECT NO. 3Recorder Kathi DeMasiX 1X 3X 5X 7X 9(Scientific name
and numbers of
each organism)

FLORA

Egregia
Ulva
Spongomorpha
Prionitis
Corallina
Gigartina
canaliculata

FLORA

Iridaea
splendens
Ulva
Gigartina
canaliculata
Corallina
Spongomorpha
Egregia

FLORA

Porphyra
Gigartina
canaliculata
Cladorpha

FLORA

Egregia
Ralfsia
Iridaea
splendens
Corallina
Ulva
Spongomorpha
Gigartina
cristata

FLORA

Ulva
Porphyra
Gigartina
canaliculata
Corallina
Rhabdodermella

FAUNA

Anthopleura
xanthogrammica
(1)
Anthopleura
elegantissima
(1)
Patiria
miniata
(2)
Leptasterias (1)
Pagurus
samuelis
(1)
Cryptochiton
stelleri (1)

FAUNA

Pisaster
ochraceous (2)
Clavelina
huntsmani (30)

FAUNA

Tegula
funeralis
(30)
Acmaea
elegantissima
(2)
Pisaster
ochraceous (1)
Thais emarginata
(1)
Thais lamellosa
(3)
Littorina
scutulata (2)
Acmaea scabra
(2)
Crepidula
adunca (4)

FAUNA

Pisaster
ochraceous
(1)
Cryptochiton
stelleri (1)
Leptasterias
pusilla (1)
Patiria
miniata (2)
Epiactis
prolifera (3)
Acmaea scabra
(2)
Crepidula
adunca (6)
Tegula
funeralis
(1)

FAUNA

Littorina
scutulata (16)
Mopalia
lingnosa (2)
Anthopleura
elegantissima
(7)
Obelia (1)
Tegula
funeralis (12)
Pagurus
samuelis (6)
Leptasterias
pusilla (3)
Clavalina
huntsmani (40)
Glycera americana
(1)

INTERTIDAL SAMPLING : Location Chimney RockDate July 7, 1970Specific Area Tide -.2 Time 8:43amBaseline Intervals
metersTRANSECT NO. 3Recorder Kathi DeMasi

<u>X11</u>	<u>X13</u>	<u>X15</u>	<u>X17</u>	<u>X19</u>
(Scientific name and numbers of each organism)				
FLORA	FLORA	FLORA	FLORA	FLORA
<u>Ulva</u> <u>Porphyra perforata</u> <u>Gigartina</u> <u>canaliculata</u> <u>Corallina</u> <u>Egrecia</u> <u>Iridaea splendens</u> <u>Spongomorpha</u> <u>Phyllospadix</u>	<u>Egrecia</u> <u>Iridaea splendens</u> <u>Spongomorpha</u> <u>Phyllospadix</u> <u>Gigartina</u> <u>canaliculata</u>	<u>Gigartina</u> <u>canaliculata</u> <u>Iridaea splendens</u> <u>Porphyra perforata</u> <u>Ralfsia</u>	<u>Ulva</u> <u>Porphyra perforata</u> <u>Gigartina</u> <u>canaliculata</u> <u>Ralfsia</u> <u>Corallina</u>	<u>Porphyra perforata</u>
FAUNA	FAUNA	FAUNA	FAUNA	FAUNA
none	<u>Leucoselinia</u> <u>healthi</u>	<u>Balanus glandula</u> (40) <u>Anthopleura</u> <u>elegantissima</u> (4) <u>Acmaea scabra</u> (3) <u>Tegula funebris</u> (12)	<u>Hemigrapsus</u> <u>nudus</u> (1) <u>Acmaea scabra</u> (20)	<u>Littorina</u> <u>scutulata</u> (12) <u>Tegula funebris</u> (12)

INTERTIDAL SAMPLING : Location Chimney RockDate July 7, 1970

Specific Area _____

Tide -.2 Time 8:48amBaseline Intervals _____
metersTRANSECT NO. 4Recorder Kathi DeMasiX 1X 3X 5

X _____

X _____

(Scientific name
and numbers of
each organism)

FLORA

Egregia
Spongomorpha
Phyllospadix

FLORA

Egregia
Spongomorpha
Phyllospadix

FLORA

Spongomorpha
Ulva
Egregia
Odenthalium
Gigartina
canaliculata
G. cristata
Ralfsia

FAUNA

Haliotis rufescens
(10) - 2"-6"

FAUNA

Strongylocentrotus
pupuratus (2)
Hinnites (2)

FAUNA

Cryptochiton
stelleri (2)
Patiria miniata
(2)
Tegula funebris
(1)

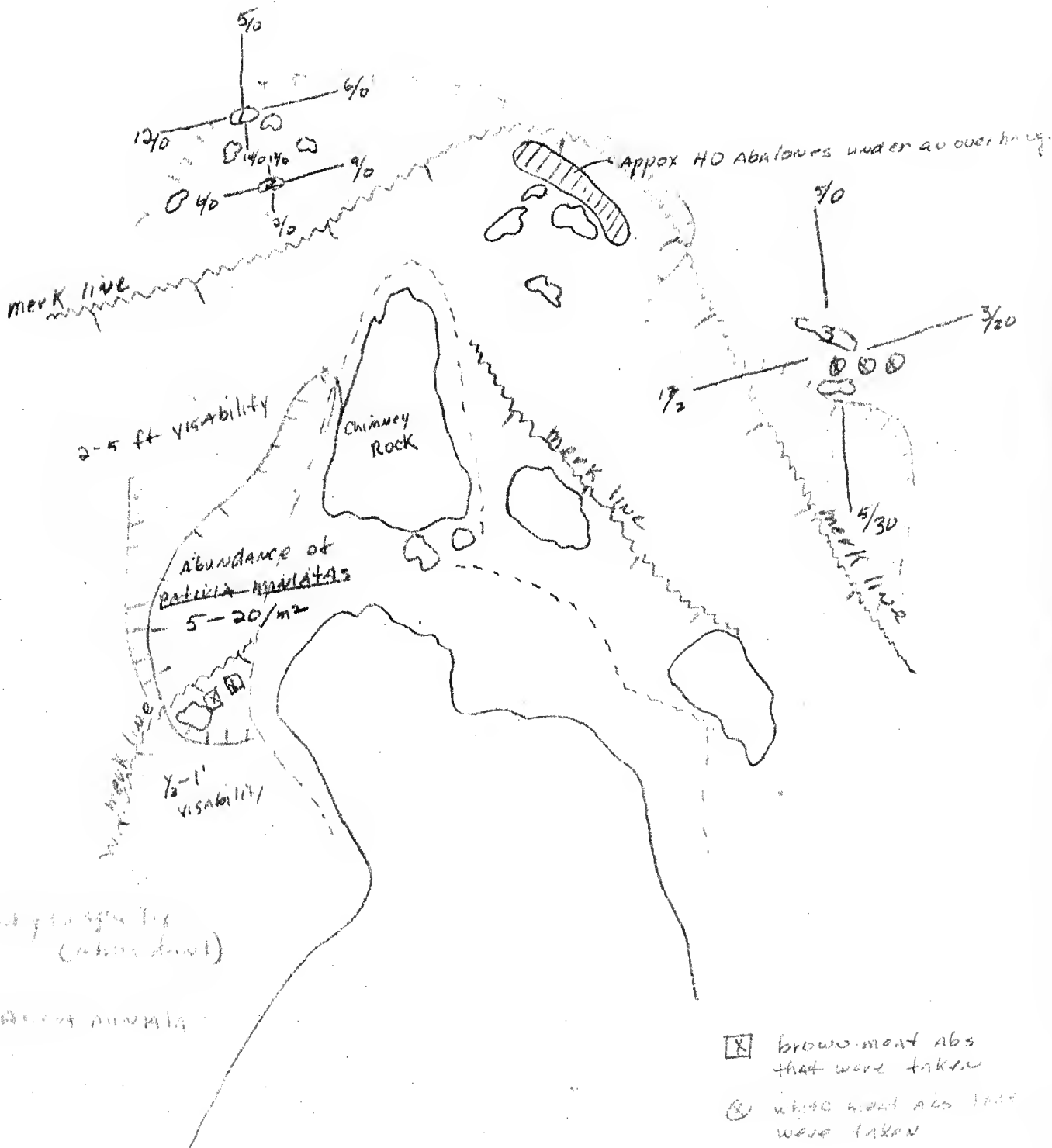
Chimney Rock.

CR-5,6,7,9

subtidal 8-1

N

5-9 ft visibility



CHIMNEY ROCK TRANSECTS #1, #2, & #3
(Subtidal)

CR-ST-5, 6, 7
8-1

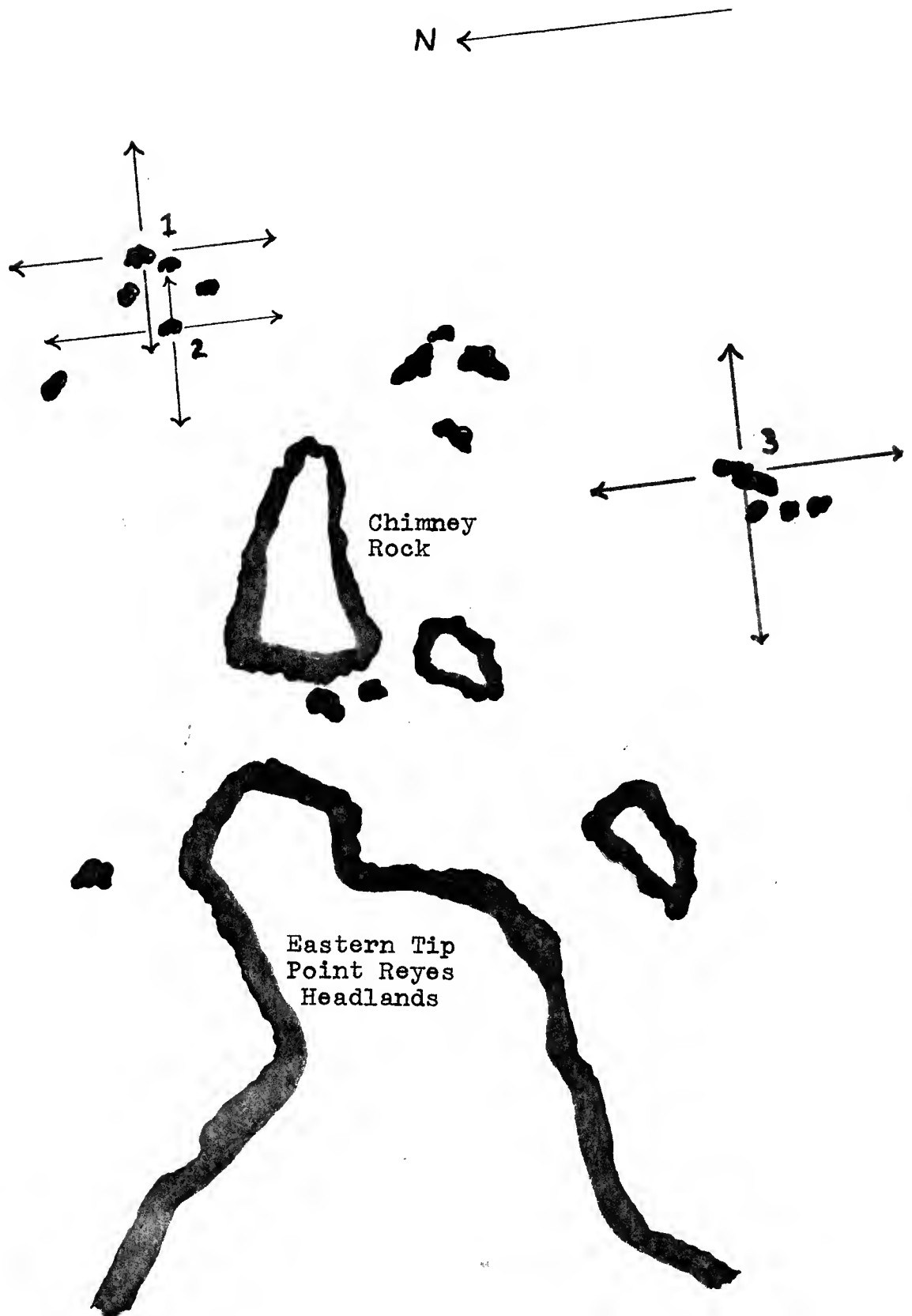
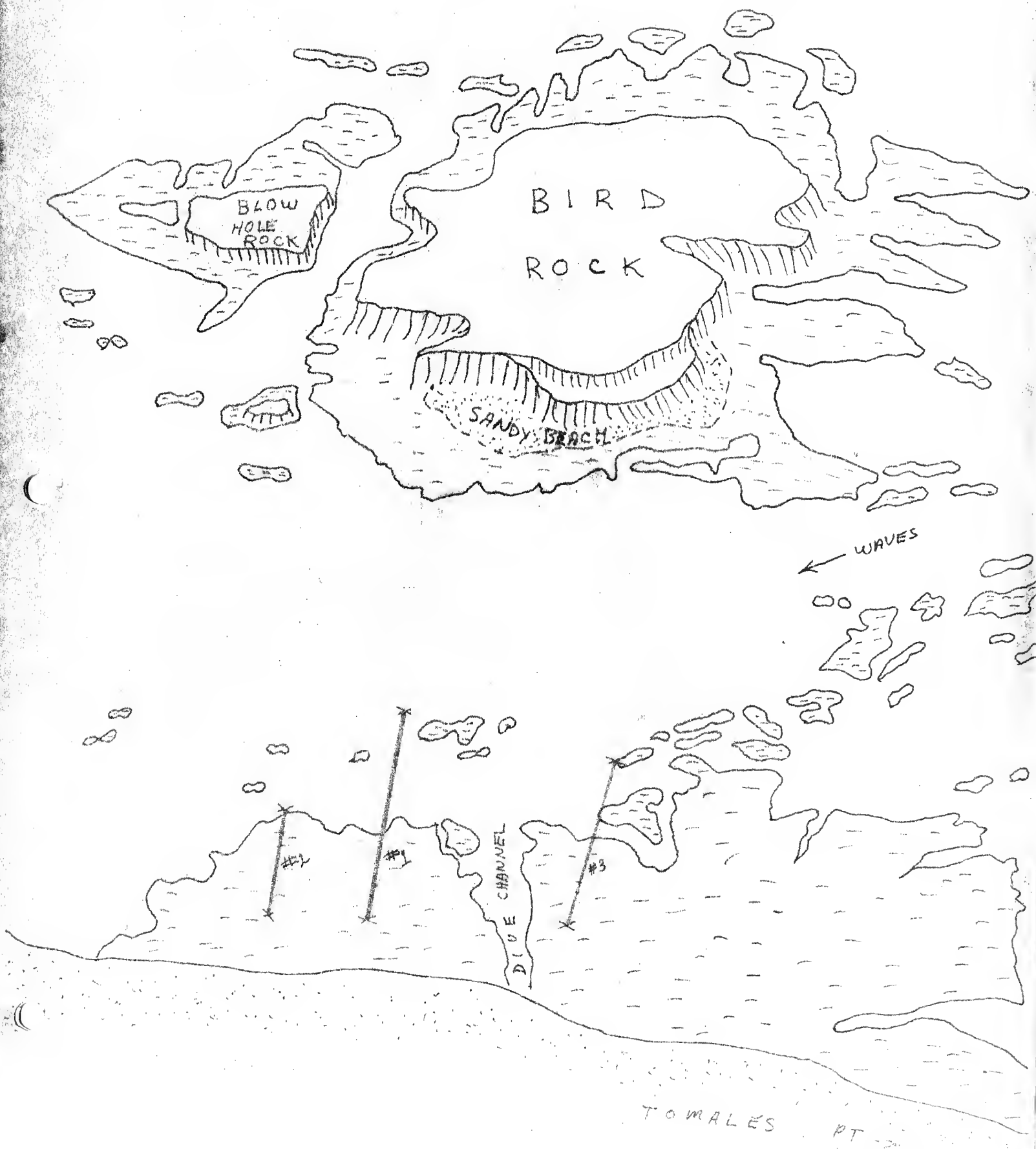


Figure 1

BR-1, 2, 3

9-1, 2, 3



handing
labels

DATA

Porifera

Leucosolenia eleanor
Aplysilla glacialis

Mollusca

Mytilus californianus

Acmaea scabra

Tegula funebris

Littorina planaxis

Thais marginata

Littorina scutulata

Acmaea digitalis

Diodora aspera

Tonicella lineata

Hermissenda crassicornis

Mopalia lignosa

Acmaea limatula

Acmaea pelta

Margarites sp.

Arthropoda

Pollicipes polymerus

Balanus glandula

Idothea stenops

Pagurus hirsutiusculus

Pagurus samuelis

Pycnogonum stearnsi

Pugettia producta

Petrolisthes cinetipes

Cancer antennarius

Pachygrapsus crassipes

Tigriopus californicus

Echinodermata

Strongylocentrotus purpuratus

Cucumaria curata

Dermasterias imbricata

Patiria minata

Pisaster ochraceus

Ceolenterata

Anthopleura xanthogrammica

Epiacthis prolifera

Chordata

Clavelina hutchinsoni

# Sample	Total No. Observations	F	$\sum x_i$	$\sum x_i^2$	S^2	S	95% C.I.
9	850	26.6	216,390	850	6,240	79.1	$14.768 \pm \mu \leq 53.968$
7	269	8.42	16,164	269	439	20.8	$1.224 \pm \mu \leq 7.196$
11	586	18.3	57,586	586	1,500	38.75	$4.893 \pm \mu \leq 31.707$
6	143	4.48	5,789	143	166	12.9	$0.017 \pm \mu \leq 8.943$
5	23	.718	163	23	4.73	2.09	$-0.005 \pm \mu \leq 1.414$
1	5	0.156	25	5	.78	.884	$0.82 \pm \mu \leq .230$
3	46	1.44	798	46	23.6	4.86	$0.241 \pm \mu \leq 3.121$
1	1	.0313	1	1	.033	.1819	$0.031 \pm \mu \leq .093$
1	1	.0313	1	1	.033	.1819	$0.031 \pm \mu \leq .093$
1	1	.0313	1	1	.033	.1819	$0.031 \pm \mu \leq .093$
1	1	.0313	1	1	.033	.1819	$0.031 \pm \mu \leq .093$
1	2	.0626	4	2	.125	.884	$0.052 \pm \mu \leq .0731$
1	3	.0939	9	3	.286	.535	$0.049 \pm \mu \leq .1388$
1	1	.0313	1	1	.033	.1819	$0.031 \pm \mu \leq .093$
4	395	12.3	96,513	395	2,930	54.2	$7.75 \pm \mu \leq 16.85$
7	380	11.9	24,000	380	629	25.1	$9.98 \pm \mu \leq 14.01$
6	59	1.84	1,057	59	30.55	5.53	$1.575 \pm \mu \leq 2.305$
3	24	0.75	200	24	5.76	2.4	$.55 \pm \mu \leq .95$
4	98	3.06	8,128	98	2.62	16.2	$1.69 \pm \mu \leq 4.42$
1	1	.0313	1	1	.033	.1819	$0.061 \pm \mu \leq .0465$
2	3	.0939	5	3	.152	.39	$0.0612 \pm \mu \leq .1266$
2	401	43.9	696,001	60,178	1401	245	$23.3 \pm \mu \leq 64.5$
2	2	.0626	2	2	.0604	.246	$0.042 \pm \mu \leq .0832$
6	10	.0313	20	10	.0612	.768	$0.064 \pm \mu \leq .0462$
1	1	.0313	1	1	.0312	.1768	$0.064 \pm \mu \leq .0462$
2	109	3.42	9,721	109	301	17.35	$1.97 \pm \mu \leq 4.87$
1	25	.78	625	25	195	4.42	$.41 \pm \mu \leq 1.15$
2	3	.0939	5	3	.151	.389	$0.0613 \pm \mu \leq .1265$
1	2	.0626	4	2	.125	.354	$0.0332 \pm \mu \leq .092$
3	6	.1875	12	6	.350	.592	$0.1378 \pm \mu \leq .2372$
10	819	25.7	146,104	819	4,022	63.4	$20.39 \pm \mu \leq 31.01$
1	5	.1561	25	5	.780	.884	$0.082 \pm \mu \leq .2302$
2	1 colony						

INTERTIDAL SAMPLING : Location Bird RockDate June 24, 1970Specific Area refer to fig.Tide -0.5 Time 10:18amBaseline Intervals _____
metersTRANSECT NO. 1Recorder Karin O'BrienX 1X 3X 5X 7X 9(Scientific name
and numbers of
each organism)

FLORA

Pelvetia
Corallina

FLORA

Gigartina cristata
Ralfsia

FLORA

Pelvetia
Gigartina crista.
Ralfsia

FLORA

Gigartina cristata
Ulva
Spongomorpha

FLORA

none

FAUNA

Mytilus
californianus
(10)
Acmaea scabra
(50)
Tegula funebris
(10)

FAUNA

Pollicipes
polymerus (80)
Mytilus
californianus
(200)
Acmaea scabra (95)
Littorina planaxis
(10)
Balanus glandula
(100)
Thais emarginata
(1)
Littorina
scutulata (5)

FAUNA

Tegula funebris
(26)
Acmaea scabra
(42)
Littorina planaxis
(40)
Idothea stenops
(1)
Anthopleura
xanthogrammica
(300)
Epiacthis
prolifera (5)

FAUNA

Anthopleura
xanthogrammica
(60)
Pagurus
hirsutiusculus
(10)

FAUNA

Pagurus samulis
(5)
Pagurus
hirsutiusculus
(8)

INTERTIDAL SAMPLING : Location Bird RockDate June 24, 1970Specific Area refer to fig.Tide -0.5 Time 10:18amBaseline Intervals _____
metersTRANSECT NO. 1Recorder Karie O'Brien

<u>X₁₁</u>	<u>X₁₃</u>	<u>X₁₅</u>	<u>X₁₇</u>	<u>X₁₉</u>
(Scientific name and numbers of each organism)				
FLORA	FLORA	FLORA	FLORA	FLORA
<u>Gigartina</u> <u>canaliculata</u> <u>Ulva</u> <u>Porphyra</u>	<u>Gigartina</u> <u>cristata</u> <u>G. californica</u> <u>Halosaccion</u>	<u>Iridaea splendens</u> <u>Corallina</u> <u>Gigartina</u> <u>cristata</u> <u>G. canaliculata</u> <u>Ralfsia</u> <u>Halosaccion</u> <u>Ulva</u>	<u>Ulva</u> <u>Halosaccion</u> <u>Iridaea</u> <u>splendens</u> <u>Egregia</u>	<u>Ulva</u> <u>Endocladia</u> <u>muricata</u> <u>Porphyra</u>
FAUNA	FAUNA	FAUNA	FAUNA	FAUNA
none	<u>Anthopleura</u> <u>xanthogrammica</u> (25) <u>Acmaea scabra</u> (50) <u>Tegula funebris</u> (10)	<u>Idothea stenops</u> (15) <u>Tegula funebris</u> (3) <u>Pycnogonum</u> <u>sternsi</u> (1) <u>Anthopleura</u> <u>xanthogrammica</u> (100)	<u>Anthopleura</u> <u>xanthogrammica</u> (7) <u>Anthopleura</u> <u>elegantissima</u> (50) <u>Mytilus</u> <u>californicus</u> (100) <u>Idothea</u> <u>stenops</u> (14) <u>Pugettia</u> <u>producta</u> (2)	<u>Petrolisthes</u> <u>cinctipes</u> (1400) <u>Pollicipes</u> <u>polymerus</u> (300) <u>Mytilus</u> <u>californicus</u> (400) <u>Strongylocentrotus</u> <u>pupuratus</u> (98) <u>Idothea stenops</u> (25) <u>Dermasterias</u> <u>imbricata</u> (2) <u>Tegula</u> <u>funebris</u> (70) <u>Anthopleura</u> <u>xanthogrammica</u> (200) <u>Cucumaria</u> <u>cucurata</u> (25)

INTERTIDAL SAMPLING : Location Bird RockDate June 24, 1970Specific Area refer toTide -.5 Time 10:18amBaseline Intervals _____
metersTRANSECT NO. 1Recorder K. O'Brien

<u>X 21</u>	<u>X 23</u>	<u>X 25</u>	<u>X 27</u>	<u>X 29</u>
(Scientific name and numbers of each organism)				
FLORA	FLORA	FLORA	FLORA	FLORA
<u>Iridaea</u> <u>splendens</u> <u>Halosaccion sp.</u> <u>Ulva sp.</u> <u>Endocladium</u> <u>muricata</u>	<u>Phyllospadix sp.</u> <u>Corallina sp.</u> <u>Egregia sp.</u> <u>Iridaea</u> <u>splendens</u> <u>Endocladium sp.</u> <u>Ralfsia sp.</u> <u>Porphyra sp.</u> <u>Halosaccion sp.</u> <u>Callophyllis sp.</u>	<u>Halosaccion sp.</u> <u>Iridaea</u> <u>splendens</u> <u>Endocladium</u> <u>muricata</u> <u>Ulva</u>	<u>Phyllospadix sp.</u> <u>Iridaea</u> <u>splendens</u> <u>Gastroclonium</u> <u>coulteri</u>	<u>Iridaea</u> <u>splendens</u> <u>Porphyra sp.</u> <u>Phyllospadix sp.</u>
FAUNA	FAUNA	FAUNA	FAUNA	FAUNA
<u>Petrolisthes</u> <u>cinctipes (1)</u> <u>Idothea stenops</u> <u>(1)</u> <u>Plocamia karykina</u> <u>(1 colony)</u> <u>Leucosolenia</u> <u>eleanor</u> <u>(1 colony)</u>	<u>Dermasterias</u> <u>umbricata (1)</u> <u>Anthopleura</u> <u>xanthogrammica</u> <u>(34)</u> <u>Diodora aspera</u> <u>(1)</u> <u>Toniacella</u> <u>lineata (1)</u> <u>Hermisenda</u> <u>crassicornis</u> <u>(1)</u> <u>Patiria miniata</u> <u>(2)</u>	<u>Clavelina</u> <u>huntsmani</u> <u>(1 colony)</u>	none	<u>Clavelina</u> <u>huntsmani</u> <u>(1 colony)</u>

INTERTIDAL SAMPLING : Location Bird RockDate June 24, 1970Specific Area refer toTide -.5 Time 10:18amBaseline Intervals TRANSECT NO. 1
metersRecorder Karie O'Brien

<u>X31</u>	<u>X33</u>	<u>X</u>	<u>X</u>	<u>X</u>
(Scientific name and numbers of each organism)				
FLORA	FLORA			
<u>Halosaccion sp.</u>	<u>Iridaea</u>			
<u>Iridaea</u>	<u>splendens</u>			
<u>splendens</u>	<u>Gigartina</u>			
<u>Corallina sp.</u>	<u>canaliculata</u>			
<u>Gigartina</u>	<u>G. californica</u>			
<u>canaliculata</u>				
FAUNA				
none				

INTERTIDAL SAMPLING : Location Bird RockDate June 24, 1970Specific Area refer toTide -0.5 Time 10:12amBaseline Intervals _____
metersTRANSECT NO. 2Recorder Karie O'Brien

<u>X 1</u>	<u>X 3</u>	<u>X 5</u>	<u>X 7</u>	<u>X 9</u>
(Scientific name and numbers of each organism)				
FLORA	FLORA	FLORA	FLORA	FLORA
<u>Spongomorpha sp.</u> <u>Porphyra sp.</u> <u>Ralfsia sp.</u>	<u>Spongomorpha sp.</u> <u>Enteromorpha</u> <u>compressa</u>	<u>Spongomorpha sp.</u> <u>Porphyra sp.</u>	<u>Iridaea</u> <u>splendens</u> <u>Phyllospadix sp.</u> <u>Porphyra sp.</u>	none
FAUNA	FAUNA	FAUNA	FAUNA	FAUNA
<u>Acmaea scabra</u> (15)	<u>Tegula funebris</u> (16) <u>Acmaea scabra</u> (10)	<u>Littorina</u> <u>planaxis</u> (5) <u>Acmaea digitalis</u> (10) <u>Acmaea scabra</u> (7) <u>Mopalia lignosa</u> (1) <u>Cancer antennarius</u> (1)	none	<u>Idothea stenops</u> (3) <u>Pagurus samuelis</u> (1)

INTERTIDAL SAMPLING : Location 3rd Rock

Date June 24, 1970

SpecificArea refer to

Tide -0.5 Time 10:18am

Recorder Karie O'Brien

Baseline Intervals meters TRANSECT NO. 3

X 1	X 3	X 5	X 7	X 9
(Scientific name and numbers of each organism)				
FLORA	FLORA	FLORA	FLORA	FLORA
none	none	none	none	<u>Pelutua sp.</u> <u>Gigartina sp.</u>
FAUNA	FAUNA	FAUNA	FAUNA	FAUNA
<u>Pachygrapsus</u> <u>crassipes</u> (1)	<u>Pachygrapsus</u> <u>crassipes</u> (1) <u>Tigriopus</u> <u>californicus</u> (1) <u>Balanus glandula</u> (20) <u>Littorina</u> <u>planaxis</u> (20) <u>Magarites sp.</u> (1)	<u>Littorina</u> <u>planaxis</u> (8) <u>Balanus glandula</u> (50)	<u>Tegula</u> <u>funnebralis</u> (27) <u>Balanus glandula</u> (50)	<u>Pachygrapsus</u> <u>crassipes</u> (1) <u>Tegula funnebralis</u> (140) <u>Mytilus</u> <u>californicus</u> (13) <u>Pagurus samuelis</u> (90) <u>Anthopleura</u> <u>xanthogrammica</u> (32)

INTERTIDAL SAMPLING : Location 1st RockDate June 24, 1970Specific Area refer toTide -0.5 Time 10:18amBaseline Intervals _____
metersTRANSECT NO. 3Recorder K. O'Brien

<u>X₁₁</u>	<u>X₁₃</u>	<u>X₁₅</u>	<u>X₁₇</u>	<u>X₁₉</u>
(Scientific name and numbers of each organism)				
FLORA	FLORA	FLORA	FLORA	FLORA
<u>Pelvetia sp.</u> <u>Gigartina</u> <u>cristata sp.</u> <u>Ralfsia sp.</u> <u>Cladophora sp.</u>	<u>Gigartina sp.</u> <u>Corallina sp.</u>	<u>Corallina sp.</u> <u>Gigartina sp.</u>	<u>Prioitis sp.</u> <u>Gigartina</u> <u>cristata</u> <u>G. canalicula</u> <u>Corallina sp.</u> <u>Clodophora sp.</u>	<u>Gigartina</u> <u>canalicula</u> <u>G. cristata</u>
FAUNA	FAUNA	FAUNA	FAUNA	FAUNA
<u>Tegula funebris</u> (70) <u>Pachygrapsus</u> <u>crassipes</u> (2) <u>Littorina</u> <u>planaxis</u> (60) <u>Thais emarginata</u> (4) <u>Mytilus</u> <u>californianus</u> (14) <u>Acmaea digitalis</u> (13)	<u>Tegula funebris</u> (150) <u>Pachygrapsus</u> <u>crassipes</u> (2) <u>Mytilus</u> <u>californicus</u> (5) <u>Pisaster</u> <u>x orchaus</u> (2) <u>balanus</u> <u>glandula</u> (50)	<u>Anthopleura</u> <u>xanthogrammica</u> (6) <u>Pagurus samuelis</u> (2) <u>Tegula</u> <u>funebris</u> (64) <u>Strongylocentro-</u> <u>tus pupuratus</u> (11) <u>Pugettia</u> <u>producta</u> (1) <u>Pagurus</u> <u>hirsutiunculus</u> (6) <u>Mytilus</u> <u>californianus</u> (60) <u>Thais emargina-</u> <u>ta</u> (11) <u>Pollicipes</u> <u>polymerus</u> (7)	<u>Thais</u> <u>emarginata</u> (3) <u>Mytilus</u> <u>californianus</u> (48) <u>Pachygrapsus</u> <u>crassipes</u> (3) <u>Piaster</u> <u>orchaus</u> (2) <u>Balanus</u> <u>glandula</u> (60) <u>Acmaea</u> <u>digitalis</u> (23) <u>Pollicipes</u> <u>polymerus</u> (8)	<u>Cancer</u> <u>antennarius</u> (1) <u>Anthopleura</u> <u>xanthogrammica</u> (5) <u>Piaster</u> <u>orchaus</u> (2) <u>Balanus</u> <u>glandula</u> (50) <u>Acmaea pelta</u> (3) <u>Acmaea limitata</u> (2) <u>Thais emarginata</u> (4)

PT. REYES NATIONAL SEASHORE PARK

BR-ST-4
9-4

BIRD ROCK

Dr. G. Chan

-2 Tide, July 1961



9-4
BR-4

subtotal
p2

Investigator _____

Year 1971 Date 8/6 Tide/Time _____ Water temp. _____ Other _____

Plot #	Oil?	Species=	Organism Count			Size-Avg. mm.			(S=shells with oil)		
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
N W S E			1			0					
			5			28					
			0			30					
			0			0					
			Σ 6			Σ 58					

Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

list all # counts			Organism Count Size= Avg. mm. (S=shells with oil)											
Plot #	Oil?	Species=	<i>Haliotis</i>			<i>Archie</i>								
		Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	
N		P ₁ , P ₂ , P ₃ , P ₄ , P ₅												
W														
S														
E														

TRANSECT WORKSHEET - G. Chan
January, 1971

BR-4
subtidal
p1

Study Site BIRD ROCK

Area _____ Section _____ Channel _____

Transect _____ Type _____

Other wash rock near

dive channel

Reference _____

Investigator _____

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1970 Date 4/24 Tide/Time _____ Water temp. _____ Other _____

Plot #	Oil?	Species=	Organism Count			Size=Avg. mm. (S=shells with oil)								
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
N		Algae, other ^{alternately in 2} n=5 plots in each (1,3,5,7,9)	12		(3,3,2,2,1)	3		(1,1,0,1,1)	13		22	2		
W		(4,6,8,10,12)	16		(7,5,3,0,1)	100		(5,7,8,17,63)						
S		(1,3,5,7,9)	4		(3,1,1,0,0)	173		(5,6,6,49,107)						
E		n=5 plots (4,6,8,10,12) 20 n ²	15		(7,3,2,1,1)	42		(2,5,3,5,27)						
			45			318								

Year 1971 Date 5/14 Tide/Time 0.8 Water temp. _____ Other _____

Plot #	Oil?	Species=	Organism Count			Size=Avg. mm. (S=shells with oil)								
			Live	Dead	Size	Live	Dead	Size	Live	Dead	Size	Live	Dead	Size
N			3			5		red						
W		fuel 10 m ² counts for each direction	5			38		red						
S			0			260		5 100 purple 160 red						
E		40 m ²	2			25		red						
			10			328								

Reference _____
Investigator _____

For the organism count of each species found, give total number alive and total number dead. If any shells have oil, give number with letter S in parentheses, e.g., (7S).

Year 1971 Date 7/27 Tide/Time 1.02 Water temp. Other

		Organism Count		Size=Avg. mm.		(S=shells with oil)	
Plot #	Species=						
	Oil? Algae, other	Live	Dead	Size	Live	Dead	Size
	N	0			0		
	E	3			0		
	S	1			0		
	W	4			0		

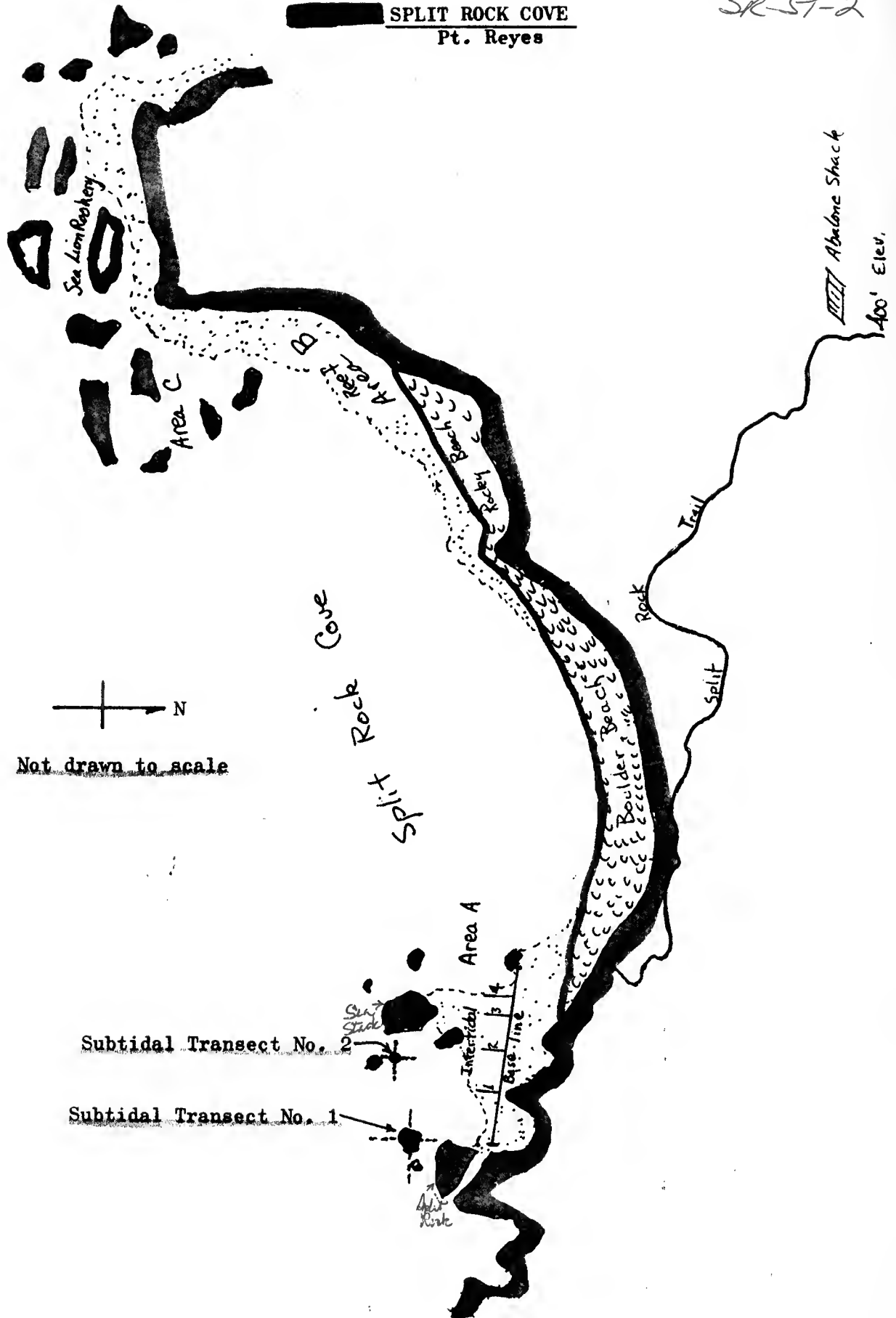
Year _____ Date _____ Tide/Time _____ Water temp. _____ Other _____

list all f_i counts

[illegible]

SR-ST-1
SR-ST-2

SPLIT ROCK COVE
Pt. Reyes



(Original Dwg by G.L. Chan)

COLLEGE OF MARIN

SUBTIDAL SAMPLING

Location Split Rock

Date 11-7-71

Sampling Area (See attached map pg. 3)

Tide 3.5 G.Gate

Landmarks (See attached map pg. 3)

Time 7:01 AM

Recorder Stan Smith

Transect #	<u>1</u>	Red (R)
Direction	<u>N</u>	Purple (P)
Sample #	Abalone	Urchin
1	0	0
Totals	0	0

Transect #	<u>1</u>	Red (R)
Direction	<u>S</u>	Purple (P)
Sample #	Abalone	Urchin
1	0	0
	0	0

Transect #	<u>1</u>	Red (R)
Direction	<u>E</u>	Purple (P)
Sample #	Abalone	Urchin
1	0	0
Totals	0	0

Transect #	<u>1</u>	Red (R)
Direction	<u>W</u>	Purple (P)
Sample #	Abalone	Urchin
1	0	0
	0	0

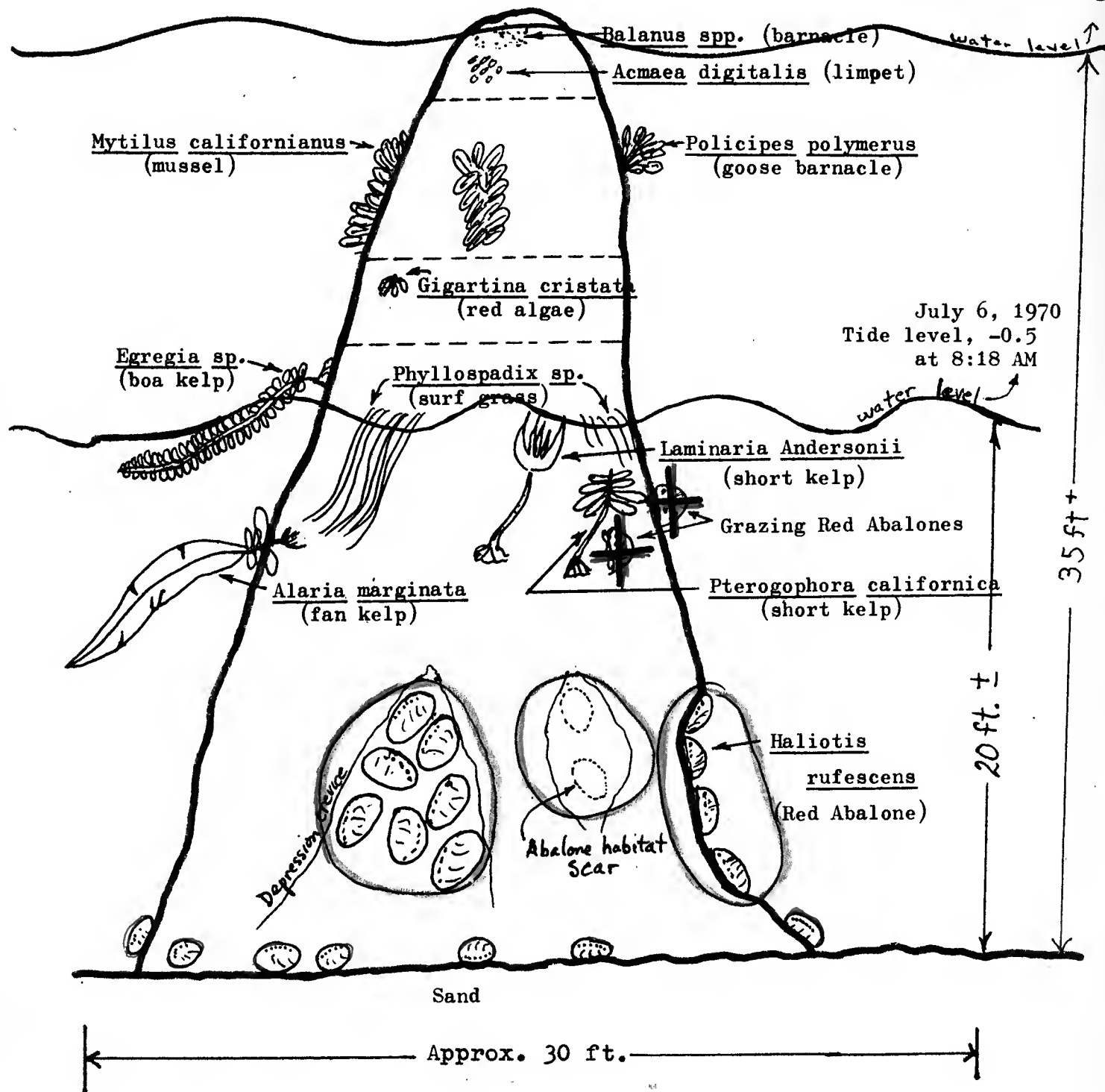
Comments and observations

During the winter months, as is now the case, the beach sand had moved out and covered any existing rocks that may have been there during the original transect taken by Dr. Chan. Sea State 0. The most exceptional day I have ever had as far as diving conditions are concerned. *5 or 6 abalones around base of rock, not in transects*

ZONATION OF ABALONES TO ALGAE, Rock Transect Site No. 2,
Split Rock, Pt. Reyes Park

(NOTE: This drawing was made in 1970. On 11-7-71, during our transect dive, I did not know from which side the drawing had been made. I assumed the north side due to similarity in the rocks physical features. The red circles indicate locations of abs at this time. The green crosses show where abs were not seen at this time.)

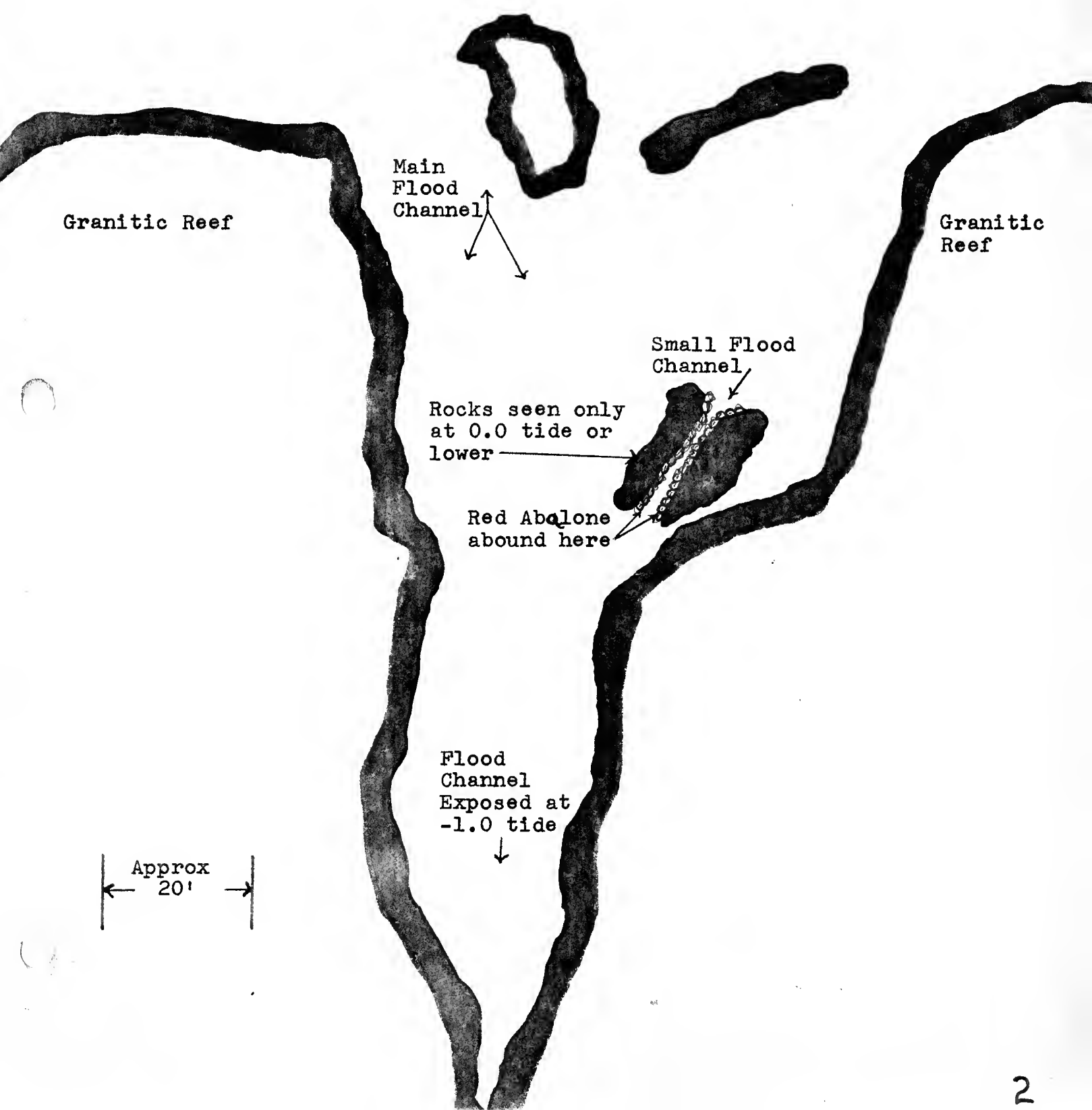
Nov. 7, 1971
Tide 5.6
at 2:00 PM (high)



Pacific Ocean



Big Pipe Approx. 50 yds. →



Granitic Reef

Main
Flood
Channel

Granitic
Reef

Small Flood
Channel

Rocks seen only
at 0.0 tide or
lower

Red Abalone
abound here

Flood
Channel
Exposed at
-1.0 tide

Approx
20' →

RED ABOLONE CENSUS Haliotis rufescens, Swainson, 1822

Reported by Dr. Chan, Stan Smith, Michael Biere, Andrea Nuessle,
Bill Sauber

Date

11/27/71

11/2/71

SEX	LOCALITY	LENGTH	NO. OF INNER GROWTH RINGS (+ or -)	COLOR OF MEAT
M	Big Pipe Reef	8"	12+	white
F	"	7 5/8 "	19+	"
M	"	7"	to scarred up to count	"
F	"	7 3/4"	10+	"
F	"	7 5/8"	13+	"

APPENDIX C

STATISTICS RECORD for _____

TRANSECT _____

Sample Size _____

(Location) _____

Transect Page _____

File Record
for SEASON/yr _____ / _____

Date _____

Field

Investigator _____

Tide/Time _____

Salinity _____

Stats Tech _____

SESSILE

MOBILE

ALL SPECIES
IN SAMPLESpecies
Codes _____1. $\sum x_i$ _____2. $\sum (x_i)^2$ _____

3. s.d. _____

4. \bar{X} _____5. 95% C.I. for
population
mean

to _____

to _____

to _____

Comments from
field worksheet _____File Record
for SEASON/yr _____ / _____

Date _____

Field

Investigator _____

Tide/Time _____

Salinity _____

Stats Tech _____

SESSILE

MOBILE

ALL SPECIES
IN SAMPLESpecies
Codes _____1. $\sum x_i$ _____2. $\sum (x_i)^2$ _____

3. s.d. _____

4. \bar{X} _____5. 95% C.I. for
population
mean

to _____

to _____

to _____

Comments from
field worksheet _____